EL01-025

KC/MY

EL01-025

DOCKET NO. EL01-025

In the Matter of — IN THE MATTER OF THE APPLICATION OF BASIN ELECTRIC POWER COOPERATIVE FOR A CONSTRUCTION PERMIT FOR 23 MILES OF 230 KV ELECTRIC TRANSMISSION LINE AND ASSOCIATED FACILITIES

Public Utilities Commission of the State of South Dakota

DATE	MEMORANDA
10/11 01	Filed and Docketed;
10/18 01	Petition for Leave to Intervene (Black Hills Power, Inc.);
10/16 01	Weekly Filing; (Opportunity to Apply for Party Status)
11/1 01	Notice of Application; Order for and Notice of Public Input Hearing; Notice
11/1 01	Notice of Public Hearing for Proposed Transmission Line;
11/14 01	Order Granting Intervention; Order Assessing Filing Fee;
11/20 01	Affidavit of Publication;
12/3 01	Application for Party Status (Andrea Lindseen);
12/3 01	Application for Party Status (David S. Lamb);
12/17 01	Transcript of Hearing held 11/28/01;
12/20 01	Order Granting Party Status;
1/22 02	Order for and Notice of Prehearing Conference;
4/25 02	Motion for Extension of Time for Final Determination;
2/8 02	Order Granting Extension of Time;
5/29 02	Notice of Withdrawal of Andrea Lindseen and David S. Lamb as Parties;
6/20 02	Stipulation;
7/24 02	Decision and Order Approving Stipulation and Granting Permit to Construct Transmission Facilities;
7/24 02	Docket Closed.
12/12 02	Surety Bond.

STATE PUBLISHING CO., PIERRE, SOUTH DAKOTA—SMEAD 104 SP14130

EL01-025

BASIN ELECTRIC POWER COOPERATIVE

1717 EAST INTERSTATE AVENUE
BISMARCK, NORTH DAKOTA 58503-0564
PHONE 701-223-0441
FAX: 701/224-5336

October 10, 2001

RECEIVED
OCT 11 2001
SOUTH DAKOTA PUBLIC
UTILITIES COMMISSION

Ms. Debra Elofson, Executive Director
SD Public Utilities Commission
Capitol Building, 1st Floor
500 East Capitol Avenue
Pierre, SD 57501-5070

Dear Ms. Elofson:

Enclosed are ten (10) copies of an application for the Rapid City Tie Project. This project consists of approximately 23 miles of 230 kilovolt (kV) transmission line and an asynchronous tie converter station.

This application was prepared to meet the requirements set forth in South Dakota Codified Law 49-41B and South Dakota Administrative Rule 20:10:22.

If you have any questions, please contact me.

Sincerely,

James K. Miller, Manager
Environmental Affairs

jab:jkm:mev
Enclosure
cc: Pennington County Auditor

MR JIM BERG
WATER QUALITY/WASTE MANAGEMENT
COORDINATOR
BASIN ELECTRIC POWER COOPERATIVE
1717 EAST INTERSTATE AVENUE
BISMARCK ND 58501-0564

fax 701-224-5336

MR. JAMES K MILLER
MANAGER OF ENVIRONMENTAL AFFAIRS
BASIN ELECTRIC POWER COOPERATIVE
1717 EAST INTERSTATE AVENUE
BISMARCK ND 58501-0564

MR R RUSSELL MATHER
STAFF COUNSEL
BASIN ELECTRIC POWER COOPERATIVE
1717 EAST INTERSTATE AVENUE
BISMARCK ND 58501-0564

fax 701-224-5343

CLAIRE M OLSON
OFFICE OF GENERAL COUNSEL
BASIN ELECTRIC POWER COOPERATIVE
1717 EAST INTERSTATE AVENUE
BISMARCK ND 58501-0564

fax 701-224-5336

MR STEVEN J HELMERS
MR LINDEN R EVANS
ATTORNEYS AT LAW
BLACK HILLS CORPORATION
PO BOX 1400
RAPID CITY SD 57709

fax 605-721-2550

MR DAVID S LAMB
4555 RESERVOIR ROAD
RAPID CITY SD 57703

MS ANDREA ANDERSEN
4555 RESERVOIR ROAD
RAPID CITY SD 57703

Post-it® Fax Note 7671	Date 12/5/01	# of pages ▶ 4
To Russ Mather	From SDPUC	
Co./Dept.	Co	
Phone #	Phone #	
Fax # 701-224-5343	Fax #	

EL01-025

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

APPLICATION

FOR

RAPID CITY TIE PROJECT

Prepared by:

BASIN ELECTRIC POWER COOPERATIVE
1717 EAST INTERSTATE AVENUE
BISMARCK, NORTH DAKOTA

and

Prepared by:

TETRA TECH EM INC.
4940 PEARL EAST CIRCLE, SUITE 100
BOULDER, COLORADO 80301
(303) 441-7900

October 2001

CONTENTS

Section **Page**

CONTENTS (continued)

CONTENTS (continued)

Appendix

EXHIBITS

Exhibit

ACRONYMS AND ABBREVIATIONS

ACSR	Aluminum conductor steel reinforced
Basin Electric	Basin Electric Cooperative Power
CBM	Coal Bed Methane
DM&E	Dakota, Minnesota & Eastern Railroad
EMF	Electric and magnetic fields
kV	Kilovolt
MCM	Million circular mills
msl	Mean sea level
mva	million volt-amperes
MW	megawatts
National Register	National Register of Historic Places
NRC	National Research Council
PRS	Power Requirements Study
PUC	Public Utilities Commission
ROW	Right of way
SD	South Dakota State Highway
SDAR	South Dakota Administrative Rule
SDCL	South Dakota Codified Law
Section line	Public Land Survey section line
Tetra Tech	Tetra Tech EM Inc.
USFWS	U.S. Fish and Wildlife Service

1.0 APPLICATION PREFACE

Basin Electric Power Cooperative (Basin Electric) is proposing construction of an asynchronous tie that would connect the eastern and western transmission grids near Rapid City, South Dakota (Exhibit 1). This project is known as the Rapid City Tie Project.

The rating of the tie would be in the range of 100 to 300 million volt-amperes (mva), depending on the capabilities of the associated transmission system and whether other utilities participate in the project. Regardless of whether other utilities participate in the project, the scope of the project would not change. The Rapid City Tie Project would include:

- Approximately 23 miles of 230 kilovolt (kV) transmission line
- A line terminal at the western edge of the project referred to as the South Rapid City Substation
- An asynchronous tie converter station (converter station) 4 miles southeast of the South Rapid City Substation
- A line terminal bay at the existing New Underwood Substation, at the eastern edge of the project

This application meets the requirements set forth in South Dakota Codified Law (SDCL) 49-41B and South Dakota Administrative Rule (SDAR) 20:10:22. The balance of this document includes the application, supporting exhibits, and supporting documents. In accordance with SDCL 49-41B-22, Basin Electric establishes that:

1. The proposed facilities comply with all applicable laws and rules;
2. The facilities will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;
3. The facilities will not substantially impair the health, safety or welfare of the inhabitants; and
4. The facilities will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

Basin Electric requests the Public Utilities Commission (PUC) of South Dakota to make complete findings and render a decision to grant a permit to construct the transmission facilities upon such

terms, conditions or modification of the construction, and operation or maintenance as the Commission may deem appropriate.

Basin Electric Power Cooperative

By: _____ Date: 10-10-01

Name, Title

2.0 APPLICATION

This Basin Electric PUC application was developed and organized to meet the requirements of the South Dakota PUC rules set forth in SDAR 20:10:22. This application is submitted to the South Dakota PUC and conforms to South Dakota statutes and rules governing energy conversion and transmission facilities.

2.1 NAME OF PARTICIPANTS (SDAR 20:10:22:06)

The applicant's name, address, and telephone number is:

Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58501-0564
(701) 223-0441

The individuals authorized to receive communications relating to the application on the behalf of Basin Electric are:

Jim Berg
Water Quality/Waste Management Coordinator
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58501-0564
(701) 223-0441

Jim K. Miller
Manager of Environmental Affairs
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58501-0564
(701) 223-0441

2.2 NAME OF OWNER AND MANAGER (SDAR 20:10:22:07)

The proposed transmission facilities are to be owned by Basin Electric. The Project Manager for this project is:

Jim R. Miller, Project Engineer
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58501-0564
(701) 223-0441

2.3 DESCRIPTION OF THE NATURE AND LOCATION OF THE FACILITY (SDCL 49-41B-11 (2))

Basin Electric is proposing construction of an asynchronous tie that will connect the eastern and western transmission grids located in Pennington County near Rapid City, South Dakota (Exhibit 1). Exhibit 2 shows the project area in greater detail.

The tie rating for the transmission line will be in the range of 100 to 300 mva, depending on the capabilities of the associated transmission system and whether others participate in the project. Regardless of whether other utilities participate in the project, the scope of the project would not change. The Rapid City Tie Project will include:

- Approximately 23 miles of 230 kV transmission line
- A line terminal bay at the South Rapid City Substation at the western edge of the project
- A converter station 4 miles southeast of the South Rapid City Substation
- A line terminal bay at the existing New Underwood Substation at the eastern edge of the project

This transmission line was established on the basis of a growing need to address reliability, to supply power to rapidly expanding cooperative loads in the greater Rapid City area, and to accommodate an anticipated need in northeastern Wyoming as a result of increased coal bed methane (CBM) extraction.

The Rapid City Tie Project is sited predominantly in crop and rangeland that are compatible with the proposed project. The 23-mile transmission line will require 295.7 acres of new right of way (ROW) along approximately 23 miles and 40 acres for the new converter station. The transmission line will cross 34 parcels of land, which are owned by 20 individual landowners. As of September 29, 2001, 6 of the 20 landowners have granted easements to Basin Electric. Of the 295.7 acres of proposed new ROW, easement has been granted on 97.6 acres, accounting for approximately 35 percent of the total new ROW required. Basin Electric is continuing to negotiate with the remaining landowners.

Basin Electric does not anticipate any deviations from the proposed alignment described in this application. However, slight deviations from the proposed centerline should be

allowed to accommodate minor changes based on landowner and engineering requirements and the final layout and construction of the transmission facilities.

2.4 PURPOSE OF FACILITY (SDAR 20:10:22:08)

Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota. It generates and transmits wholesale electricity to 120 member rural electric systems in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. These member systems, in turn, distribute electricity to about 1.7 million consumers.

Basin Electric was formed in 1961 by 67 member cooperatives, after the U.S. Department of the Interior announced that the federal hydropower system would not be able to meet the additional energy requirements of the region's rural electric cooperatives and other preference customers of the U.S. Bureau of Reclamation beyond the winter of 1965. Basin Electric was formed as a wholesale power supplier to plan, design, construct, and operate generating facilities necessary to meet the growing electrical demands of its member systems.

Construction of the proposed Rapid City Tie Project is required to meet the growing needs for power of Basin Electric's membership in South Dakota and in northeastern Wyoming. The project is proposed because of a growing need to address reliability and to supply power to supply power to rapidly expanding cooperative loads in the greater Rapid City area. A portion of this growing need for power is a result of the CBM extraction projects currently occurring in the Powder River Basin in northeastern Wyoming. CBM production experts have estimated that 65,000 to 120,000 CBM wells will be drilled in the Powder River Basin during the next 20 to 30 years. Each of these wells and the associated pipeline compression facilities will require new electrical service.

Currently, Basin Electric's generation capacity on its western electrical system is inadequate to meet this growing need for electricity, and the transmission system from Basin Electric's existing western interconnected generation facilities is inadequate to transmit the required power. As a result, Basin Electric has proposed to build the new Rapid City Tie Project to directly input power from its interconnected eastern generation facilities to this area of South Dakota and Wyoming, where demand for power is growing.

2.5 ESTIMATED COST OF FACILITY (SDAR 20:10:22:09)

The estimated total cost of this facility is $70 million. The major components of this estimate are as follows:

Converter station	$49.0 million
230 kV transmission line (23 miles)	$9.1 million
Terminal facility at New Underwood Substation	$0.8 million
Terminal facility at South Rapid City Substation	$0.8 million
Engineering, overhead, interest during construction, contingency	$10.3 million

Basin Electric received bids for the converter station from three different contractors. The three bids for the converter station used different technologies, capital costs, and efficiencies of operation. Basin Electric will evaluate the bids in terms of efficiency of operation and capital cost, which could result in award of a contract to other than the lowest initial bidder. Therefore, the converter station contract could be significantly different than this estimate.

2.6 DEMAND FOR FACILITY (SDAR 20:10:22:10)

The estimated consumer demand for future energy is 300 megawatts (MW), of which 200 MW will be directly served by the proposed facility. The future demands were forecasted using econometric modeling techniques, with values for variables provided by several governmental and private sources. The load forecast was documented in the 1998 Power Requirements Study (PRS), which has since been updated several times, most recently in July 2001. The PRS and its revisions are reviewed and approved by the affected membership, by the Basin Board of Directors, and by the Rural Utilities Service of the U.S. Department of Agriculture. This project will provide additional reliability to the western distribution system that serves western South Dakota and northeastern Wyoming. If the proposed facility is not constructed by 2003, the consequences will be a violation of electrical transmission system operating criteria due to poor system performance.

2.7 GENERAL SITE DESCRIPTION (SDAR 20:10:22:11)

This section describes the site including the transmission line, the South Rapid City Substation, the converter station, the New Underwood Station, and the general topographic features of the proposed site.

2.7.1 Transmission Line

The proposed transmission line would extend east from the South Rapid City Substation to the converter station and to the New Underwood Substation and will consist of approximately 23 miles of 230 kV transmission line (see Exhibit 2).

The preferred route for the proposed 230 kV transmission line would begin at the South Rapid City Substation and extend directly east along a section line for 2.25 miles. The proposed 230 kV transmission line would then intersect an existing 69 kV transmission line that has a north-south orientation and is owned by Black Hills Electric Cooperative (BHEC). The proposed 230 kV transmission line would turn south at the intersection for approximately 1 mile and would be double-circuited with the 69 kV transmission line to the next section line, a point near South Dakota State Highway (SD) 79. The proposed 230 kV transmission line along with the existing 69 kV transmission line would then turn east (continuing the double circuit) and extend along the north side of the section line for more than 0.75 mile where the proposed 230 kV transmission line would enter the proposed converter station.

The proposed 230 kV transmission line would then exit the east side of the proposed converter station just north of the section line, then it would cross to the south side and parallel the section line for about 6.5 miles to a point just south of SD 44. The proposed 230 kV transmission line would double-circuit with the existing 69 kV transmission line for about 1.5 miles of this 6.5-mile segment. Within the 6.5-mile segment, the line would cross Dry Creek (two crossings); a Dakota, Minnesota & Eastern Railroad (DM&E) line; Cyclone Ditch; South Side Ditch; and Rapid Creek. From the point just east of Rapid Creek and south of SD 44, the proposed 230 kV transmission line would turn approximately 45 degrees northeast and extend 2.5 miles, crossing Lone Tree Ditch and Murphy Ditch. The proposed 230 kV transmission line would then turn approximately 20 degrees east-northeast and extend approximately 4 miles to a point along a section line. The proposed 230 kV transmission line would then extend directly east along the south side of the section line for approximately 5 miles to a point just west of a north-south section line. The final portion of the proposed 230 kV transmission line would extend approximately 0.33 mile northeastward and enter the existing New Underwood Substation.

The transmission line would consist of single-pole and two-pole structures for the western portion of the route, until it reaches the angle point near SD 44; two-pole and three-pole, H-frame structures comprise the balance of the route. Single-pole structures would also support a 69 kV

circuit owned by a member of Rushmore Electric, which in turn is a member of Basin Electric. Portions of an existing 69 kV line would be removed and replaced by the new double-circuit line.

2.7.2 South Rapid City Substation

The South Rapid City Substation is located near the southern edge of Rapid City approximately 0.5 miles south of Interstate Highway 16 Truck Bypass and 1 mile east of Interstate Highway 16 (see Exhibit 2). The western portion of the proposed project would include construction of a bay within the South Rapid City Substation. The line terminal bay at the South Rapid City Substation would be designed and constructed concurrently with and will match the balance of the facility.

2.7.3 Converter Station

The converter station would be located approximately 4 miles southeast of the South Rapid City Substation, along the route of the 230 kV transmission line, and would be owned by Basin Electric (see Exhibit 2). The converter station property would comprise approximately 40 acres. It would consist of outdoor and indoor electrical equipment. Outdoor equipment would include concrete foundations, steel structures, electrical insulators, and equipment such as transformers, switches, circuit breakers, and capacitor banks. Converter equipment would be housed indoors. The size, shape, and components of the converter equipment and the building will vary depending on the manufacturer. Potential suppliers and their proposals are being evaluated.

2.7.4 New Underwood Substation

The existing New Underwood Substation is located slightly more than 1 mile south of the town of New Underwood, South Dakota (see Exhibit 2). The eastern portion of the proposed project would include construction of a bay in the New Underwood Substation. The line terminal bay at the New Underwood Substation would be designed to match and coordinate with existing facilities.

2.7.5 General Topographic Features of the Project

The elevation of the proposed corridor for the proposed project ranges from 3,540 feet (1,079 meters) above mean sea level (msl) in the west to 2,900 feet (884 meters) above msl in the east.

The terrain in the region is relatively flat with some rolling hills. Topographic maps of the proposed project area are provided as Exhibits 3A and 3B.

2.8 ALTERNATIVE SITES (SDAR 20:10:22:12)

This section presents the general criteria used to select the proposed and alternative transmission sites, an evaluation of alternative sites considered, and an evaluation of the advantages of the proposed transmission facility.

2.8.1 Evaluation Criteria

Basin Electric conducted a systematic evaluation of alternative routing for the proposed project to select the most feasible alignment based on such considerations as cost, cooperation of land owners, topographic features, environmental concerns and regulations, and engineering. Components of Basin Electric's alternative evaluation criteria include the following:

- Studying the entire proposed area of the project using aerial photographs, maps, and existing land use databases
- Screening the area of the project to identify restricted and potentially incompatible areas, including conflicting land uses, existing structures or developments, and potentially challenging environmental features such as ponds, lakes, or hills
- Identifying alternative corridors that are predominantly along existing section lines between the existing South Rapid City and New Underwood substations
- Completing field surveys by a multidisciplinary team including a project engineer, environmental compliance specialist, and land use planner
- Holding meetings with landowners along various alternative corridors to identify potential conflicts and incompatibilities and to assess the probable level of cooperation
- Conducting a comparative assessment of selected environmental corridors using criteria on environmental, land use, engineering, and cost evaluation considerations
- Identifying the preferred corridor for the proposed Rapid City Tie Project based on consideration of the above factors

An initial screening process followed by field reconnaissance identified alternatives to the proposed project. The initial task involved: (1) delineation of the boundaries of the project area

relative to the proposed endpoints of the alignment, and (2) examination of aerial photographs, maps of existing and future land uses, transportation and utility maps, and maps that show environmental features including floodplains, wetlands, and soils. This initial review was completed to eliminate from further consideration areas that are obviously unsuitable as a site for the transmission line. Based on the results of the screening evaluation, acceptable sections and nodes of the corridor were identified, drawn on a map, and combined into route alignments. Alternative alignments were evaluated through field reconnaissance and screened against specific evaluation criteria.

Screening criteria that contributed to the selection of the proposed transmission line alignment included:

- Minimization of the length of the corridor
- High accessibility for construction and maintenance
- Minimization of the number of permits required for construction and operation
- Minimization of visual impacts
- Siting in area without zoning restrictions and away from recreational and residential developments
- Minimization of the number of homes and buildings adjacent to the corridor
- Minimization of the number of properties the transmission line would cross
- Minimization of potential impacts to known wetlands, threatened and endangered species, sensitive habitats, waters of the U.S., and other environmental resources
- Willingness of property owners to sell ROWs
- Optimization of the benefits of the transmission line to Basin Electric and its customers
- Elimination of alignments more than 25 miles long
- Minimization of costs associated with ROW acquisition, construction, and maintenance
- Elimination of alignments that did not predominantly coincide with section lines, existing property boundaries, and utility ROWs to comply with agency requests that these areas be avoided, where possible

Individual weighting factors were assigned to each of the above criteria to standardize the relative degree of importance and were summed for each alternative alignment to provide an estimate of the potential benefits each offered.

2.8.2 Alternatives Sites Evaluated

The routing process included a systematic evaluation of various route alignments between the South Rapid City Substation and the New Underwood Substation, with due consideration for a converter station site along the route. The alternative routes that were evaluated are shown in Exhibits 4, 5, and 6. The preferred route and the following three alternative routes were evaluated:

- Alternative 1 – A route south of the South Rapid City Substation for 1 mile and then eastward, crossing SD 79 and connecting with the preferred route.
- Alternative 2 – A route described as the projection of the diagonal section from the crossing with SD 44 northeastward until it intersects with a projection westward of the east-west section from the New Underwood Substation.
- Alternative 3 – A route directly east from the crossing with SD 44 to a point across the highway south of New Underwood and then northward into the New Underwood Substation.

A detailed discussion of the alternative route evaluation is presented in Section 3.0 of the Environmental Report located in Appendix C of this PUC application.

2.8.3 Advantages of Proposed Transmission Facility

The evaluation of alternatives reveals that the alignment proposed best addresses the needs of Basin Electric and its customers while minimizing impacts to the environment, existing land uses, concerns of land owners, and regulatory requirements. The proposed alignment was selected because its accessibility, location, and scoring relative to the selection criteria chosen were comparable or superior to the other alternatives evaluated. Furthermore, the proposed alignment is compatible with land uses in the region, avoids potentially unfavorable features (such as existing or future residential communities, commercial developments, transportation corridors, and schools), and minimizes the need to cross environmentally sensitive or significant features including wetlands, potentially sensitive habitats, waterways, and vegetation communities.

2.9 ENVIRONMENTAL INFORMATION (SDAR 20:10:22:13)

Basin Electric has completed an Environmental Report for the Rapid City Tie Project that is located in Appendix C of this application. The existing environment is described in detail in Section 4.0 of the Environmental Report. Estimates of the changes and impacts to the existing environment from activities associated with ROW clearing and construction and maintenance of the proposed transmission facilities are discussed in detail in Section 5.0 of the Environmental Report.

The proposed alignment for the transmission line would minimize changes and impacts to the existing environment by following existing property boundaries, road and utility ROWs, siting in areas with compatible land use, avoiding potentially unfavorable human features, and minimizing the need to cross environmentally sensitive or significant features. The Environmental Report demonstrates that the proposed project will have insignificant impact on all factors evaluated. It is not anticipated that this project will create any significant direct, cumulative, or synergistic hazards to the health and welfare of human, plant or animal communities.

2.10 EFFECT ON PHYSICAL ENVIRONMENT (SDAR 20:10:22:14)

This section provides information on the effect of the proposed transmission line facility on the physical environment.

2.10.1 Regional Land Forms

The proposed project makes use of existing hilltops and ridges for construction of poles and towers and a flat area for the converter station. No significant grading or earthmoving will be required. As a result, no direct, indirect, or cumulative impacts to regional land forms are anticipated by the project. Regional land forms are discussed more specifically in conjunction with the project area topography in Section 2.10.2.

2.10.2 Topography

A topographic map of the project area is provided in Exhibits 3A and 3B. The Black Hills Uplift, a large, dome-like feature located in western South Dakota including western Pennington County, largely influences topography in the region. Regional topography is generally characterized by

rolling hills and plains dissected by streams. The western portion of the proposed transmission facility area is hilly, with elevations ranging from 3,200 feet (975 meters) above msl near Dry Creek to more than 3,700 feet (1,128 meters) above msl in the westernmost portion of the proposed corridor (Exhibit 3A). However, the floodplain of Rapid Creek is wide and flat. Rapid Creek drains into the Cheyenne River several miles southeast of the project area.

East of Rapid Creek, the corridor for the proposed project extends diagonally to the northeast (Exhibit 3B). Much of the area along this portion of the alignment is relatively flat, cultivated cropland or rangeland that becomes hillier to the north. Elevations increase from approximately 2,900 feet (884 meters) above msl at Rapid Creek to approximately 3,500 feet (1,067 meters) above msl near the northeastern terminus of the diagonal. This area is characterized by numerous steep ephemeral drainages that transport storm water from areas north of the proposed project toward Rapid Creek.

The proposed transmission line turns directly east along a section line at the northeastern terminus of the diagonal. The last portion of the diagonal and the beginning of the east-trending portion of the corridor for the proposed project descends a steep slope that eventually reaches the Box Elder Creek drainage basin. The area features numerous steep ephemeral drainages that transport storm water from the proposed corridor in a northerly direction toward Box Elder Creek and numerous diked surface water impoundments for watering stock.

2.10.3 Geologic Features

The Rapid City Tie Project is located on the eastern flank of the geologic feature known as the Black Hills Uplift. The Black Hills Uplift exposes older erosion resistant rocks in its center and younger, weaker rocks along the periphery. The project area is located in this peripheral zone. The Black Hills region, including the study area, is underlain by Precambrian age metamorphic (rocks altered by heat or pressure) schist, slate, and quartzite. Eastern Pennington County is characterized by sedimentary rocks of limestone, shale, and sandstone of Paleozoic and Mesozoic age. Geologic formations exposed in the study area are mostly sediments of Cretaceous age (SDGS 1998).

The structural geology of the study area is not complex. The sedimentary formations dip gradually away from the Black Hills Uplift at approximately three to five degrees (Cattermole

1972). Some small amplitude folds occur in the area. No faults have been mapped in the study area.

Engineering geologic problems in the study area are primarily landsliding, mudflows, and expansive soils. The landslide deposits mostly occur on the steep, north-facing slopes of the interstream divides and in areas disturbed by excavation. The landslides are primarily of the block glide or slump type. Mudflows, although not restricted to areas of landsliding, are common along the lower margins of slump landslides (McGregor and Cattermole 1973). The project area geologic features are discussed in more detail in the Section 4.8 of the Environmental Report located in Appendix C.

2.10.4 Economic Deposits

No economic mineral deposits are identified in the project area according to the Soil Survey of Custer and Pennington Counties (USDA 1996).

2.10.5 Soil Type

Soils in the proposed transmission facility generally fall into one of six mapped groups. Soils in this region are formed primarily from the in place weathering of sedimentary rocks. Organic matter is slow to accumulate, and fertility is low. Soils in this region are classified as entisols, alfisols, mollisols, and aridisols.

Soils west of the proposed transmission facility are of the Canyon-Rockoa-Rock Outcrop Series. Other soil units in the proposed transmission facility west of Rapid Creek include the Nunn-Satana Association, the Samsil-Pierre Association, and the Minnequa-Manvel-Penrose Association. Soils in the eastern portion of the study area, in the vicinity of Box Elder Creek, are predominantly of the Samsil-Pierre and Pierre-Kyle Associations. The soil types in the project area are described in more detail in Section 4.8 of the Environmental Report located in Appendix C of this PUC application. A soil type map is also provided in the Environmental Report as Figure 4-7.

2.10.6 Potential for Erosion and Sedimentation

Impacts to soils from the proposed project would be insignificant. As many as 150 acres of soil could be disturbed during construction of tower sites, the converter station, and the access road

for the converter station. Direct impacts to geologic resources and soils within the proposed corridor could include localized increases in potential for erosion from wind, water runoff, compaction, and rutting.

Areas that are cleared or disturbed by construction could be susceptible to erosion. The impacts from erosion are a function of the local soil type and land slope and the amount of clearing required. The proposed site of the converter station and associated access road are located in a relatively flat area. Relatively large portions of the proposed transmission line corridor, however, are located in areas with steep slopes and drainages. The potential for soil erosion and resulting sedimentation of downgradient wetlands, drainages, and streams is higher in these steeper areas. Reduced absorption caused when heavy construction equipment compacts the soils can also aggravate erosion. However, outside the location of the converter station site, impacts from construction of the transmission lines would be limited to pole tower sites since vegetation within the remainder of the proposed corridor would not be cleared or disturbed. No significant impacts related to the increase in potential for erosion are therefore expected as a result of construction of the transmission line. Areas that are disturbed by construction equipment are expected to recover with native vegetation after the construction equipment is permanently removed.

2.10.7 Seismic Risks, Subsidence Potential, and Slope Instability

Seismic hazards in the study area are rated as very low. Based on the 1996 United States Geological Survey Shaking Hazard Maps, all of Pennington County, excluding the extreme southwestern corner, shows a 1 in 10 chance that a force of 0 to 2 percent of gravity would be experienced in a 50-year period (USGS 1996).

No potentially hazardous geologic areas, such as slumps or landslides, would be affected by construction of the converter station or associated power poles and towers. As a result, no direct, indirect, or cumulative impacts to geologic resources are anticipated by the project.

Basin Electric's proposed transmission facilities will be designed and constructed in accordance with all applicable codes and will incorporate state-of-the-art standards to address potential structural difficulties associated with seismic, subsidence, or slope instability. In general, soils in the project area are expected to provide adequate foundation for transmission line structures without concern of subsidence and the converter station is located in a flat area where slope instability will not be an issue.

2.10.8 Geological Constraints

There do not appear to be any geological characteristics that present unusual constraints to the design, construction, or operation of the proposed facilities.

2.11 HYDROLOGY (SDAR 20:10:22:15)

This section provides information on the hydrology of the project area and the effect of the proposed transmission line facilities on surface and groundwater.

2.11.1 Hydrologic Map

Exhibit 7 shows surface water drainage patterns and the floodplains associated with each drainage. The primary surface water bodies in the project area are Rapid Creek and Dry Creek. Box Elder Creek is located 2 miles north of the eastern half of the proposed transmission facility. No other major rivers, lakes, streams, or reservoirs are located within several miles of the study area. Dry Creek flows discontinuously during much of the year.

Other surface water in the project area occurs mainly as irrigation canals, isolated backwater areas and oxbows associated with Rapid Creek, and diked or impounded ponds in pastureland used for pasture irrigation and stock watering. Numerous ephemeral streams and drainages pass through the project area, as well. Irrigation ditches located in the project area include Cyclone Ditch, South Side Ditch, an abandoned canal ditch, and Lone Tree Ditch.

Impacts to surface water from the proposed project would be insignificant. All water bodies and associated buffer zones that would be crossed by the transmission alignment are less than 100 feet wide. As a result, the maximum constructed pole interval of 750 feet anticipated for the proposed transmission line will enable all water bodies and buffer zones along the alignment of the transmission line to be physically spanned.

Direct, temporary impacts to the quality of water in Rapid Creek, Dry Creek, and other small water bodies that would be spanned by the transmission line are anticipated to be minor. These impacts could result from construction near streams that could disturb adjacent vegetation, increasing the potential for erosion. Potential erosion of stream banks could increases the total suspended solids and sediment content in surface water.

Construction would be conducted in accordance with a plan for control of sediment and erosion. After construction, no direct, indirect, or cumulative impacts to surface water quality resulting from the proposed transmission line facilities are anticipated.

2.11.2 Effect on Current Planned Water Uses

The proposed transmission facilities would not use either municipal or private water and therefore, would have no impacts on planned water uses by communities, agriculture, recreation, fish, or wildlife.

2.11.3 Surface and Groundwater Use by Proposed Facility

The proposed transmission facilities would not require consumptive use of or discharge to any surface water body or groundwater.

2.11.4 Aquifer Use by Proposed Facility

The proposed transmission facilities would not require the use of groundwater as a source of potable water supply or process water.

2.11.5 Water Storage, Reprocessing, and Cooling by Proposed Facility

No water storage, reprocessing, or cooling would be required for the construction or operation of the proposed transmission facilities.

2.11.6 Deep Well Injection Use by Proposed Facility

No deep well injection would be required for the construction or operation of the proposed transmission facilities.

2.12 EFFECT ON TERRESTRIAL ECOSYSTEMS (SDAR 20:10:22:16)

This section contains information on the terrestrial ecosystem potentially affected by the proposed transmission facilities. More detailed information resulting from biological field surveys conducted to identify and quantify the terrestrial fauna and flora potentially affected by the

proposed transmission facilities are contained in Sections 4.5 through 4.7 of the Environmental Report located in Appendix C of this PUC application. An analysis of the impact of construction and operation of the proposed facilities on the terrestrial biotic environment are discussed in Sections 5.5 through 5.7 of the Environmental Report located in Appendix C of this PUC application.

2.12.1 Effect on Terrestrial Fauna

The proposed project construction is not expected to significantly disrupt wildlife in the area. The area in and around the proposed transmission facility is dominated by rangeland, pasture, and cropland habitats. Wildlife in these habitats is made up of species adapted to urban, grassland, and riparian areas such as deer, antelope, prairie dogs, grouse, ducks, geese, hawks, eagles, and songbirds. Domesticated animals raised in the region include cattle, sheep, and hogs.

During the field reconnaissance, approximately six potential bald eagle roost or feeding trees were identified that may be in the path of the transmission line. Upon a more detailed examination, no bald eagle roosts or nests could be verified at these sites. In addition, the field reconnaissance identified several additional potential bald eagle roost or feeding trees along Dry Creek and Rapid Creek. At this time, there is no evidence that the six trees that may be in the path of the proposed transmission line have been used as roosts or feeding trees for bald eagles. If roosting or nesting bald eagles are encountered during construction, Basin Electric will cease construction activities in the vicinity of the roosting or nesting trees and work with the U.S. Fish and Wildlife Service (USFWS) to develop a mitigation plan that is appropriate and acceptable.

The addition of the power lines could have long-term impacts by increasing the mortality of birds, raptors, and waterfowl. Collisions are a concern for birds and waterfowl, especially in riparian areas. Additionally, most raptors are intolerant of human activity during the breeding season, and a decline in raptor nesting within the project area may occur during the project. Raptor electrocution is also a concern with electrical poles and wires.

Construction of the converter station could result in the permanent loss of prairie dog habitat. Twenty acres of black-tailed prairie dog town would be permanently removed for construction of the converter station and access roads. Other species may be indirectly affected. Prairie dogs are an important source of food for many predators, and a variety of species use their burrows for habitat. In addition, the new power poles would create new perches in the area where few trees

exist, creating new hunting opportunities for raptors including eagles. The USFWS has noted that the black-tailed prairie dog is a species of concern, but the agency has not yet listed the black-tailed prairie dog as threatened.

Vegetation and trees that are removed during construction will be replanted nearby to limit displacement of wildlife. Grasses will be reseeded, and shrubs will be replaced with container-grown plants.

2.12.2 Effect on Terrestrial Flora

Impacts to vegetation in the project area are anticipated to be minor. Short-term impacts (that affect vegetation for 1 year or less) could include disturbance, removal, and soil compaction caused by: (1) conducting ground control surveys; (2) performing geotechnical investigations; (3) preparing equipment yards and construction trailer sites; and (4) clearing, grubbing, grading, and drilling hole foundations for installation of transmission poles.

Long-term impacts could be caused by installation of power poles, access roads, and the converter station, as well as ongoing maintenance along the route of the power line. Removal of the vegetation could increase erosion and temporarily reduce the diversity in plant species. Shrubs and trees are slower to establish; therefore, a diverse vegetative cover would be reestablished within a decade.

Construction associated with the project may have minor indirect effects on vegetation in the project area by increasing the potential for establishment of noxious weeds. Disturbed soil creates a hospitable environment for invasion of weeds, and project-related traffic may provide a transport mechanism for seeds of noxious weeds to the area. Removal of vegetation may increase erosion and sedimentation. Increased runoff on bare and compacted soils could create gullies and change the overall landscape.

Cumulative impacts to vegetation are anticipated to be minor and include the effects from farming and ranching. The primary land use in the project area consists of ranching and farming: these practices have been changing the landscape for many years. Future agricultural use of the area may continue to change the landscape. This and future projects should have an insignificant impact on vegetation, as most areas have been altered from their natural state.

Construction would be sequenced to limit disruption to any area at one time to reduce the impact of construction on vegetation. After construction is complete, any compacted soil would be tilled and the area would be reseeded with native grasses and forbs. Because of their slower growth and establishment, shrubs would be replaced with container-grown plants to decrease time for establishment. Trees removed during construction would be relocated or replaced.

2.13 EFFECT ON AQUATIC ECOSYSTEMS (SDAR 20:10:22:17)

This section contains information on the aquatic ecosystems potentially affected by the proposed transmission facilities. Existing information resulting from biological surveys conducted to identify and quantify the aquatic fauna and flora potentially affected within the transmission site or siting area are discussed in more detail in Sections 4.2 and 4.3 of the Environmental Report located in Appendix C of this PUC application. An analysis of the impact of construction and operation of the proposed facilities on the aquatic biotic environment are discussed in Sections 5.2 and 5.3 of the Environmental Report located in Appendix C of this PUC application.

With the primary exception of aquatic ecosystems associated with the channels of Rapid Creek, Box Elder Creek, and Dry Creek, the majority of wetlands in the region are emergent and are associated with irrigation diversions and stock ponds. The acreage of wetlands within 0.5 mile of the centerline of the proposed project is approximately 20 acres. Of these 20 acres, approximately 18 acres are estimated to be palustrine emergent wetlands associated with impounded water. Most of the remaining 2 acres of wetlands within the project corridor are riverine wetlands along Rapid Creek.

The proposed project is expected to have a minimal effect on wetlands. All wetlands and associated buffer areas crossed by or near the proposed transmission line corridor are narrow (less than 130-foot wide within the corridor) and are located in low areas between hills or draws. Poles for the proposed project will be spaced at maximum 750-foot intervals and will be located on hilltops, along ridges, and away from low areas.

2.14 LAND USE (SDAR 20:10:22:18)

This section provides information concerning the present and anticipated use or condition of the land.

2.14.1 Land Use Map

Exhibit 8 and Exhibit 9 depict land use and ownership within the proposed project corridor. The proposed transmission line and converter station would cross a diverse landscape with a mixture of land uses, including: dry land and irrigated cropland; range land; streams, irrigation canals, riparian corridors; designated 100-year floodplains; stock ponds; urban and rural residential areas; industrial land; various transportation corridors, animal feed lot corrals; grain bin storage; salvage yards; the flight path for the Rapid City Regional Airport; a highway maintenance yard; a sanitary landfill; and existing substations located on the east and west ends of the project. The proposed transmission line crosses several transportation corridors including SD 79, SD 44, and the DM&E railroad line. The proposed transmission line would traverse 99 percent private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances. The proposed corridor does not contain land that is administered by federal, state, or local governments.

2.14.2 Homes and Persons Displaced

There will be no homes or persons displaced as a result of the construction, operation, or maintenance of the proposed transmission facilities.

2.14.3 Land Use Compatibility

The proposed transmission facilities are compatible with the present land uses of the surrounding area. The majority of the proposed transmission line traverses private land that is zoned agricultural. The project area is characterized by rolling rangelands with a view of the Black Hills west of the project corridor. The addition of power lines to the area would have minimal direct or indirect impacts on the already linear features of the landscape, as existing roads, fencing, and power lines transect the area. Construction would temporarily alter the area.

Development of land in the region would continue to have cumulative impacts by changing the landscape from cropland and rangeland to rural and urban developments. Recent developments such as highway development, roads, an auto salvage yard, landfill, substations, and power lines add to the permanent linear change in the landscape.

2.14.4 Effect on Land Use

The proposed project would have a minimal impact on land use. The majority of the proposed transmission line traverses private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances. The 23-mile transmission line will require 295.7 acres of new ROW along approximately 23 miles and 40 acres for the new converter station. The transmission line will cross 34 parcels of land, which are owned by 20 individual landowners. The remaining land consists of both nonagricultural private and public lands such as the highway maintenance yard, a sanitary landfill, SD 79, SD 44, and the DM&E railroad line.

The short-term impacts would include disruption of vegetation and farming caused by:

- Preparing equipment yards and construction trailer sites
- Clearing, grubbing, and grading for installation of the converter station
- Clearing, grubbing, grading, and drilling hole foundations for installation of transmission poles
- Temporary closure of access to livestock and farm irrigation, tilling, and harvesting operations

With exception of the converter station, the short-term disturbances to vegetation would be repaired soon after construction is completed. Most disturbances to farming would be expected to be infrequent and last only a day per disruption. Closure of access to livestock and farm irrigation, tilling, and harvesting operations will be minimized to reduce local occupational disruption.

The long-term impacts would include disruption of vegetation and farming caused by:

- Installation of two-track access roads
- Ongoing maintenance along the route of the power line
- Construction of the converter station and installation of a section line road to access the site
- Loss of crops, hay, or livestock forage within the ROW and the construction area for the converter station

The cumulative impact of the utility line corridor would be anticipated to have minimal effect on land use. The primary land use in this project area consists of ranching and farming: these practices have been changing the landscape for many years. Future practices may continue to change land use. This and future projects should have minimal impacts on land use.

2.15 LOCAL LAND USE CONTROLS (SDAR 20:10:22:19)

The proposed transmission facilities are located predominantly on private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances. There are no rezoning permits required by Pennington County for the construction, use, and maintenance of the proposed transmission facilities.

A Pennington County conditional use permit is required for the installation of the converter station. The county zoning will remain agricultural because the converter station site acreage is 40 acres. The requirements for the conditional use permit application include submittal of the legal description of the property and a site plan, drawn to scale, showing the boundaries of the property, any proposed buildings, and access points to the property. A petition to build a road on the section line ROW is also required. Basin Electric with assistance of the Pennington County Planning staff is required to notify land owners within 500 feet of the subject property of the conditional use permit application. A public hearing will be held and the Planning Commission will consider the application and make a recommendation to the Pennington County Board of Commissioners. The Pennington County Board of Commissioners will make the final decision on the conditional use permit application. If the conditional use permit is approved, a building permit application must be submitted and approved at the county level.

The Rapid City Planning Department was contacted regarding zoning or land use approvals. A platting procedure is required for acreage under 40 acres. Since the converter site is 40 acres, a platting procedure is not required. No other permits or permitting procedures are required by Rapid City.

2.16 WATER QUALITY (SDAR 20:10:22:20)

Construction of the proposed transmission line would comply with all applicable federal, state, and local permits required for alteration of wetlands, streams, or rivers resulting from the project.

The following are specific measures that would be taken to protect water quality in the proposed project corridor:

- Best management practices would be implemented to minimize erosion and sedimentation, runoff, and surface instability during construction.
- Construction would be conducted to minimize disturbances around surface water bodies to the extent possible.
- Current drainage patterns in areas affected by construction would be maintained to the extent possible.
- Staging areas for project-related construction equipment would be located in areas that are not environmentally sensitive to control erosion.
- Any work in existing streams would be conducted, to the extent possible, during low flow periods or when the streams are dry.
- If stream crossings are required, temporary bridges would be constructed at as close to a right angle with the stream as possible. After related construction, all temporary construction crossings would be removed and the area would be restored as nearly as possible to its original condition.
- Staging and laydown yards for project-related construction would be established at least 50 feet from waterways or wetlands, if permitted by topography. No vegetation would be cleared between the yard and the waterway or wetland.
- Construction equipment would not be serviced within 25 feet of waterways or wetlands. Equipment would not be fueled within 100 feet of the waterways or wetlands.
- Any spills of fuels or other hazardous materials during construction or system maintenance would be promptly contained and cleaned up.
- Any herbicides used in ROW maintenance would be approved by U.S. Environmental Protection Agency and applied by licensed professionals. Application of herbicides would be limited to the extent necessary for regular maintenance of the transmission system.

2.17 AIR QUALITY (SDAR 20:10:22:21)

Particulate emissions associated with construction of the utility line and converter station would be mitigated using dust-suppression techniques. Examples of measures for control of particulates are, if necessary:

- Applying water or dust palliatives, such as magnesium chloride, to disturbed areas, as necessary, to reduce dust when vehicle traffic is present.
- Covering open haul trucks with tarps both on site and off site.
- Ensuring that construction vehicles use paved roads wherever possible to access the construction ROW.

- Limiting vehicle speeds on unpaved roads and in the construction ROW to 20 miles per hour, or as required to control dust.
- Removing any soil or mud deposited by construction equipment on paved roads near the egress from unpaved areas, when necessary.
- Stabilizing disturbed areas in compliance with the revegetation plan after construction is complete

With implementation of these mitigation measures, particulate emissions from construction would be substantially reduced. Accordingly, particulate emissions from construction of the project, as mitigated, are considered less than significant. No significant emissions are expected from the operation of the transmission facilities.

2.18 TIME SCHEDULE (SDAR 20:10:22:22)

The time schedule for this project is graphically depicted on the Gantt Chart attached as Exhibit 10. The Rapid City Tie Project started in December 2000 and project completion is expected by April 2003. The critical path in this schedule involves design, procurement, and installation of the converter station. The parallel critical path is the South Dakota PUC application, hearing, and permitting process, followed by imminent domain procedures and subsequent transmission line construction.

Contractors are currently preparing bids for the converter station based on the specified April 2003 completion date and they also have the option to provide an alternate bid with a project completion date of September 2003. Basin Electric plans to receive project bids in October 2001 and anticipates awarding a contract in November 2001. In the event of contract award with the alternate project completion date of September 2003, the converter station and the transmission line construction schedules will be revised accordingly.

2.19 COMMUNITY IMPACT (SDAR 20:10:22:23)

This section identifies and analyzes the effects the construction, operation, and maintenance of the proposed transmission facilities will have on: socioeconomic, taxation, agricultural production, population and community, transportation, and cultural resources. A detailed discussion of community impacts within the project area is provided in Sections 5.1, 5.4, and 5.12 through 5.16 of the Environmental Report located in Appendix C of this PUC application.

2.19.1 Forecast of Socioeconomic Impact

No significant adverse socioeconomic impacts to the local communities and governmental facilities or services are anticipated as a result of the construction and maintenance of the proposed transmission facilities. It is expected that the project will provide socioeconomic benefit by providing employment opportunities, increased demand for locally-supplied construction equipment, increased reliability of available electrical power, and additional power for a rapidly expanding area of Pennington County.

2.19.2 Forecast of Taxation Impacts

No significant immediate or long-term impact on property and other taxes of the affected taxing jurisdictions are anticipated as a result of the construction and maintenance of the proposed transmission facilities.

2.19.3 Forecast of Agricultural Impacts

Short-term impacts to agriculture are expected to last no more than a day per disruption and would primarily impact access to livestock and farm irrigation, tilling, and harvesting operations. The small conversion of agricultural land to the transmission line ROW and substation construction area are expected to have minimal impact on the overall crop production within the proposed project corridor.

2.19.4 Forecast of Population and Community Impacts

The proposed transmission project is not expected to substantially impact the population, income, occupational distribution, or the integration and cohesion of the adjacent communities. The population of Pennington County in 2000 was estimated at 88,565 (Census 2001) and is not expected to change on a short-term basis as a result of this project. However, long-term population increases could result from increased power availability in the area.

2.19.5 Forecast of Transportation Impacts

No significant direct, indirect, or cumulative impacts are expected to the transportation systems of cities, counties, and the state. Short-term impacts may include minor traffic delays caused when

wires are strung across roadways or rail lines. Any such short-term roadway or railway closings would be scheduled with appropriate authorities and marked clearly, and detour routes would be provided as necessary. Construction of the proposed project would be expected to cause only insignificant adverse transportation effects to public access as a result of roadway congestion from worker's vehicles.

2.19.6 Forecast of Cultural Resource Impacts

Basin Electric has conducted a records search and an on site cultural resources inventory of the project area. The results of the cultural resources study are discussed in Section 5.4 of the Environmental Report located in Appendix C of this PUC application. The proposed project corridor contains five sites and several ditches that could be considered eligible for inclusion on the National Register of Historic Places (National Register). The proposed project is expected to have minimal impact on these cultural resources of the area as long as construction does not disturb the aboriginal stone cairns at two of the sites discussed in the Environmental Report. During construction and maintenance of the proposed transmission facilities, Basin Electric will not disturb areas noted as eligible for inclusion on the National Register.

2.20 EMPLOYMENT ESTIMATES (SDAR 20:10:22:24)

Transmission line and converter station construction would employ approximately 30 to 60 workers for a period of 6 to 12 months. No more than 60 construction workers would be required throughout this construction period. According to the South Dakota Governor's Office of Economic Development, in 1999 there were 1,998 workers employed in the mining and construction industry. An additional 60 workers for one year would be approximately a 3 percent increase in the mining and construction industry sector. It is expected that the majority of the construction work force will be native to the Rapid City metropolitan area. Once operational, local employees would maintain the proposed transmission facility, if necessary. No permanent additional employment is expected.

2.21 FUTURE ADDITIONS AND MODIFICATIONS (SDAR 20:10:22:25)

Basin Electric does not request approval of any future additions or modifications under this permit application. The converter site includes space for a future 230/69kV delivery point for its

member, Rushmore Electric, however the timing, cost, and other details of that facility are unknown at this time.

2.22 TRANSMISSION FACILITY LAYOUT AND CONSTRUCTION (SDAR 20:10:22:34)

This section includes information on the transmission facility layout and construction. Specifically this section contains Basin Electric's policy statement concerning route clearing; construction, landscaping, and a description of plans for ROW maintenance, including restoration, revegetation, and weed control.

2.22.1 Vegetation Clearing

The transmission line would cross primarily rangeland and cropland and as such no extensive tree clearing or removal would be needed during the construction of the line. Only trees that would affect the transmission line directly would be removed. Vegetation will be cleared as needed in a few areas of the ROW for construction and maintenance of the line. Construction would be sequenced to limit disruption to any area at one time to reduce the impact of construction on vegetation. After construction is complete, any compacted soil would be tilled and the area would be reseeded with native grasses and forbs. Because of their slower growth and establishment, shrubs would be replaced with container-grown plants to decrease time for establishment. Trees removed during construction would be replaced.

2.22.2 Soils

Any soils removed during borings for the transmission line structures would be used for backfill. Any remaining material would be spread and mounded near the base of the transmission line structures. After construction is complete, any compacted soil would be tilled and the area would be reseeded with native grasses and forbs.

All areas that would be disturbed by construction of the converter station would have the topsoil removed and stockpiled for future use. Best management practices would be initiated to minimize any sediment and provide for erosion control. In addition, Basin Electric would follow the recommendations of the district conservationist to minimize soil erosion.

2.22.3 Herbicides and Sterilants (Weed Control)

Because the primary landuse along the transmission line corridor is rangeland and cropland, it would not be necessary to use herbicides or sterilants for construction of the proposed transmission line. All areas within the converter station fence line and the access road to the converter station site would be surfaced with a 6-inch layer of gravel. Upon completion of construction of the converter station, a soil-applied herbicide would be applied to all gravel surfacing for vegetation control. Any herbicides used in ROW maintenance would be approved by the U.S. Environmental Protection Agency and applied by licensed professionals. Application of herbicides would be limited to the extent necessary for regular maintenance of the transmission system.

2.22.4 Construction Site Access

In conjunction with the transmission facilities a new road along the section line would need to be built to provide access to the converter station site. This road would be approximately one mile in length. All other access would be on existing approaches or existing roads. Best management practices would be implemented to minimize erosion and sedimentation, runoff, and surface instability during access road construction.

2.22.5 Waste Disposal

All waste generated during the construction of the project would be disposed of at an approved landfill on a daily basis.

2.22.6 Restoration and Revegetation

All disturbed areas would be seeded, mulched and revegetated in consultation with the local district conservationist or county extension office. Landowner desires will also be considered in determining seed type depending on the adjacent landuse. The entire line would be inspected one year after construction and restoration is complete to evaluate the success of the restoration. If restoration efforts were unsuccessful, reseeding would be performed as necessary.

2.23.3 Proposed Transmission Site and Major Alternatives

The proposed transmission site and major alternatives are depicted on a map in Exhibit 2. Exhibits 11, 12, and 13 show the proposed transmission site on overhead or aerial photographs.

2.23.4 Reliability and Safety

The proposed transmission line would be constructed in full compliance with all applicable National Electrical Safety Code electrical performance and safety codes and, as a result, would not present significant impacts posed by safety or electrical hazard to the general public.
The flow of electricity produces electric and magnetic fields (commonly referred to as EMF). Magnetic and electric fields are strongest at the source of electrical power and decrease markedly as the distance from the source increases. In many cases, people are exposed to higher levels of EMF from household appliances than from transmission lines because the source is closer.

Numerous sources of EMF exist in nature and in the occupational and residential environments. In nearly all instances, these fields pose no obvious threat to human health or safety. However, public awareness of the ubiquitous nature of these fields, and the historical controversy over their potential effects on living systems, have stimulated the research community to define more precisely the physical properties of these fields and to delineate the thresholds for their possible effects on human health and the environment.

Certain epidemiological investigations have indicated potential risk factors in a number of residential and occupational studies from exposure to EMF. However, many studies report no statistically significant correlation. A recent Danish residential study reported that while consumption of electricity in Denmark has increased by 30 times since 1945, the incident rate of cancer had changed little (Guenel and others 1993). In 1996, the National Research Council (NRC) completed a study of research on EMF that had been under way since 1979. The study concluded that the evidence so far "does not show that exposure to these fields (such as EMF) presents a human health hazard" (NRC 1996).

In conclusion, although a substantial amount of research on EMF has been completed and is continuing, the body of research on health effects is still preliminary and inconclusive. The emerging evidence no longer allows the assertion that there are no risks; still, there is no basis for asserting that there is a significant risk. Because the majority of the proposed alignment would be

located in rural, undeveloped areas, the potential for effects is further diminished and direct, indirect, and cumulative impacts are not anticipated to be significant.

A new converter station would operate along with the proposed transmission line. Operation of the converter station would present a potential safety and electric hazard to the general public because of the high voltage that passes through the converter station. The hazard would be effectively mitigated by construction of a fence with warning signs posted at appropriate intervals surrounding the converter station.

2.23.5 Right of Way or Condemnation Requirements

Approximately one third of the easements for the proposed transmission facility project have been acquired. Negotiations and appraisals are being conducted with the remaining landowners.

2.23.6 Necessary Clearing Activities

No significant clearing activities are anticipated for the proposed transmission facilities. The majority of clearing activities would be concentrated at the proposed converter station site. Between 10 and 25 acres of the 40-acre site would need to be cleared of vegetation for construction. Several large cottonwood trees located on private property would have to be removed and replaced if possible. The landowner has been informed and understands the need for removal for safety and reliability reasons.

2.23.7 Configuration of Underground Facilities

No underground facilities would be required for the proposed transmission facilities.

2.24 ADDITIONAL INFORMATION IN APPLICATION (SDAR 20:10:22:36)

This application contains all information necessary for the local review committees to assess the effects of the proposed facilities pursuant to SDCL 49-41B-7 and 49-41B-11. This application also contains all information necessary to meet the burden of proof specified in SDCL 49-41B-22.

2.25 TESTIMONY AND EXHIBITS (SDAR 20:10:22:39)

This document includes all data, exhibits, and related testimony necessary to support the content of the application. Exhibit 14 presents the list of preparers supporting the information contained in this application.

3.0 REFERENCES

Cattermole, J. Mark. 1972. Geologic Map of the Rapid City East Quadrangle, Pennington County, South Dakota. U.S. Geological Survey, Geologic Quadrangle Map GQ-986. 1:24,000.

Guenel, P., P. Raskmark, X. Andersen, and E. Lynge. 1993. Incidence of Cancer in Persons with Occupational Exposure to Electromagnetic Fields in Denmark. British Medical Journal 50:758-764.

McGregor, Edward E., and Cattermole, J. Mark. 1973. Geologic Map of the Rapid City NW Quadrangle, Meade and Pennington Counties, South Dakota. U.S. Geological Survey, Geologic Quadrangle Map GQ-1093. 1:24,000.

National Resource Council (NRC). 1996. Possible Health Effects of Exposure to Residential Electric and Magnetic Fields. Committee on the Possible Effects of Electromagnetic Fields on Biological Systems. National Academy Press.

South Dakota Geological Survey (SDGS). 1998. Internet resources. Accessed on April 11, 2001. On-line Address: http://www.sdgs.usd.edu/.

U.S. Census Bureau (Census). 2001. Population and other demographics for various years. Accessed on March 28, 2001. On-Line Address: http://www.census.gov/.

U.S. Department of Agriculture (USDA). 1996. Soil Survey of Custer and Pennington Counties, Prairie Parts, South Dakota. Soil Conservation Service.

U.S. Geological Survey (USGS). 1996. National Seismic Shaking Hazard [online]. Accessed on April 11, 2001. On-line Address: http://geohazards.cr.usgs.gov/eq/index.html.

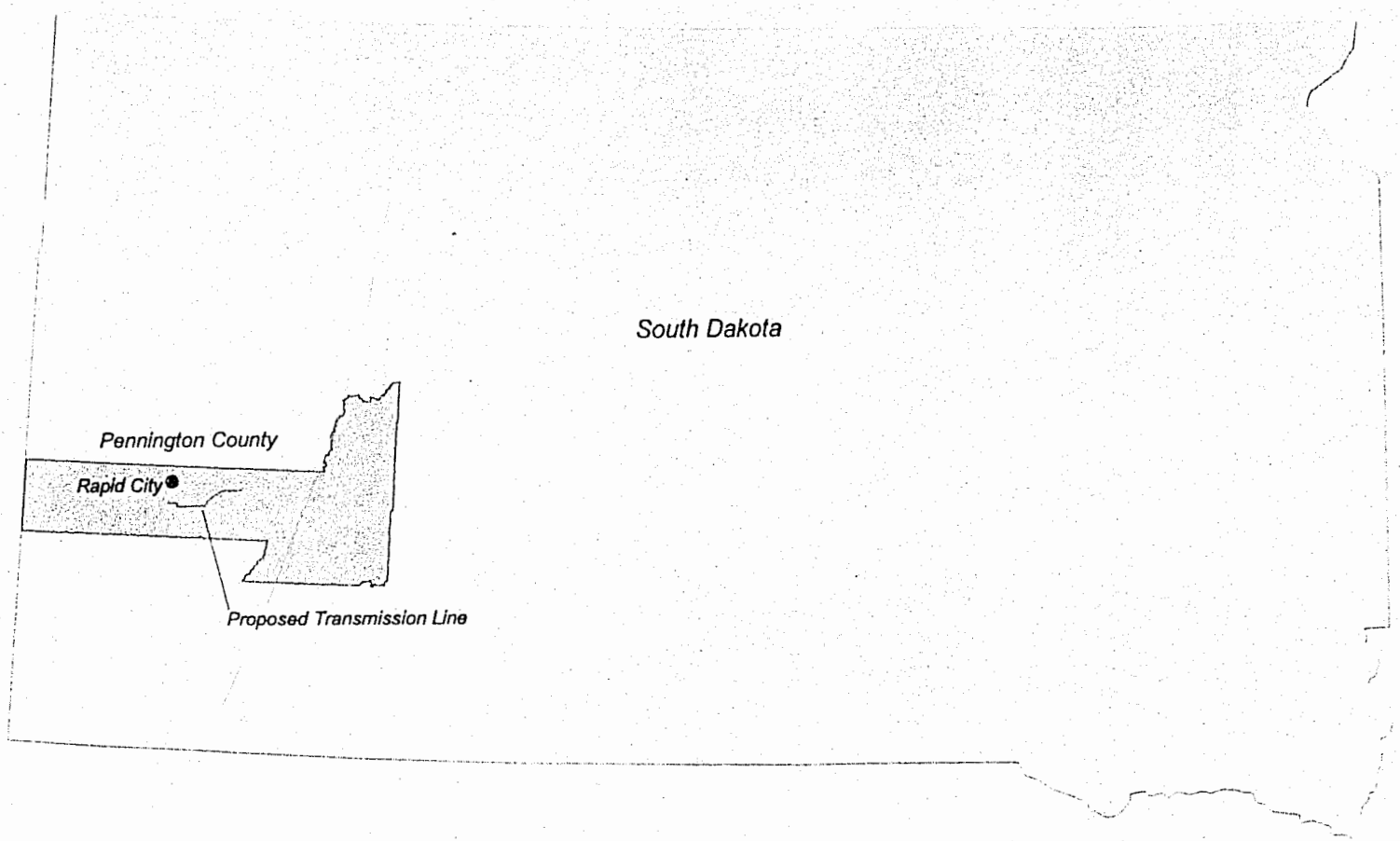
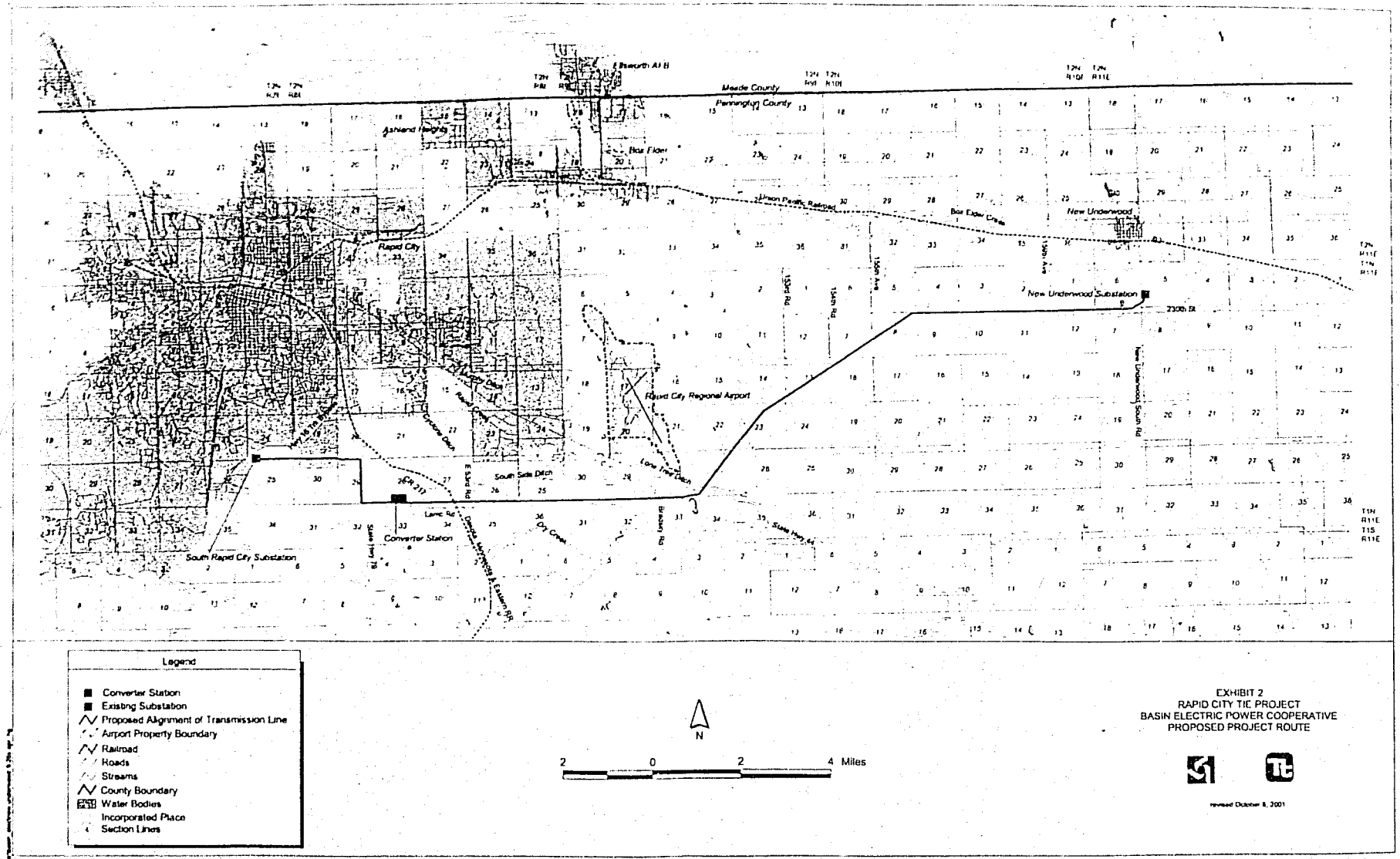


EXHIBIT 1
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
AREA MAP

Revised September 4, 2003



Legend

- Converter Station
- Existing Substation
- Proposed Alignment of Transmission Line
- Airport Property Boundary
- Railroad
- Roads
- Streams
- County Boundary
- Water Bodies
- Incorporated Place
- Section Lines

N

2 0 2 4 Miles

EXHIBIT 2
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PROPOSED PROJECT ROUTE

revised October 8, 2001

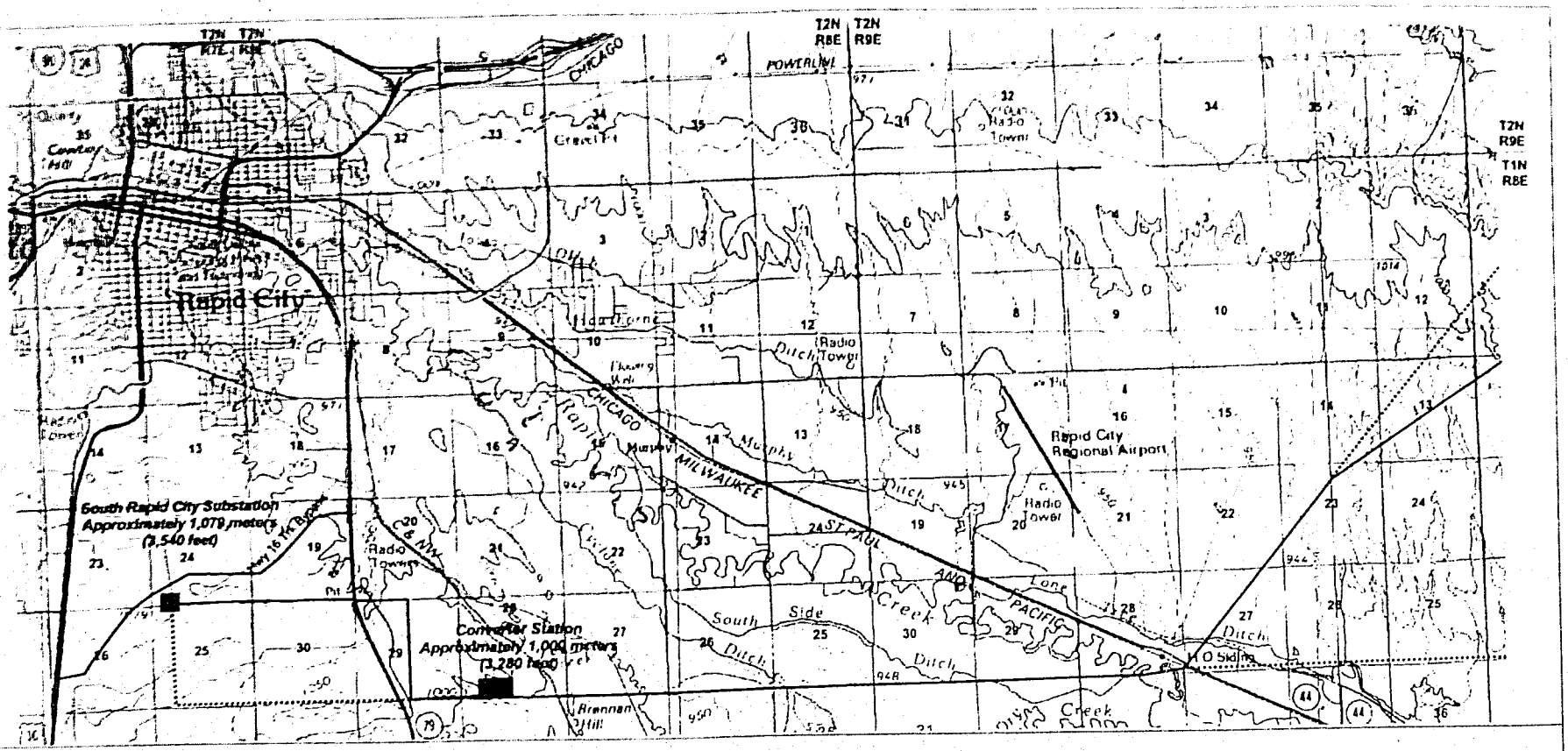
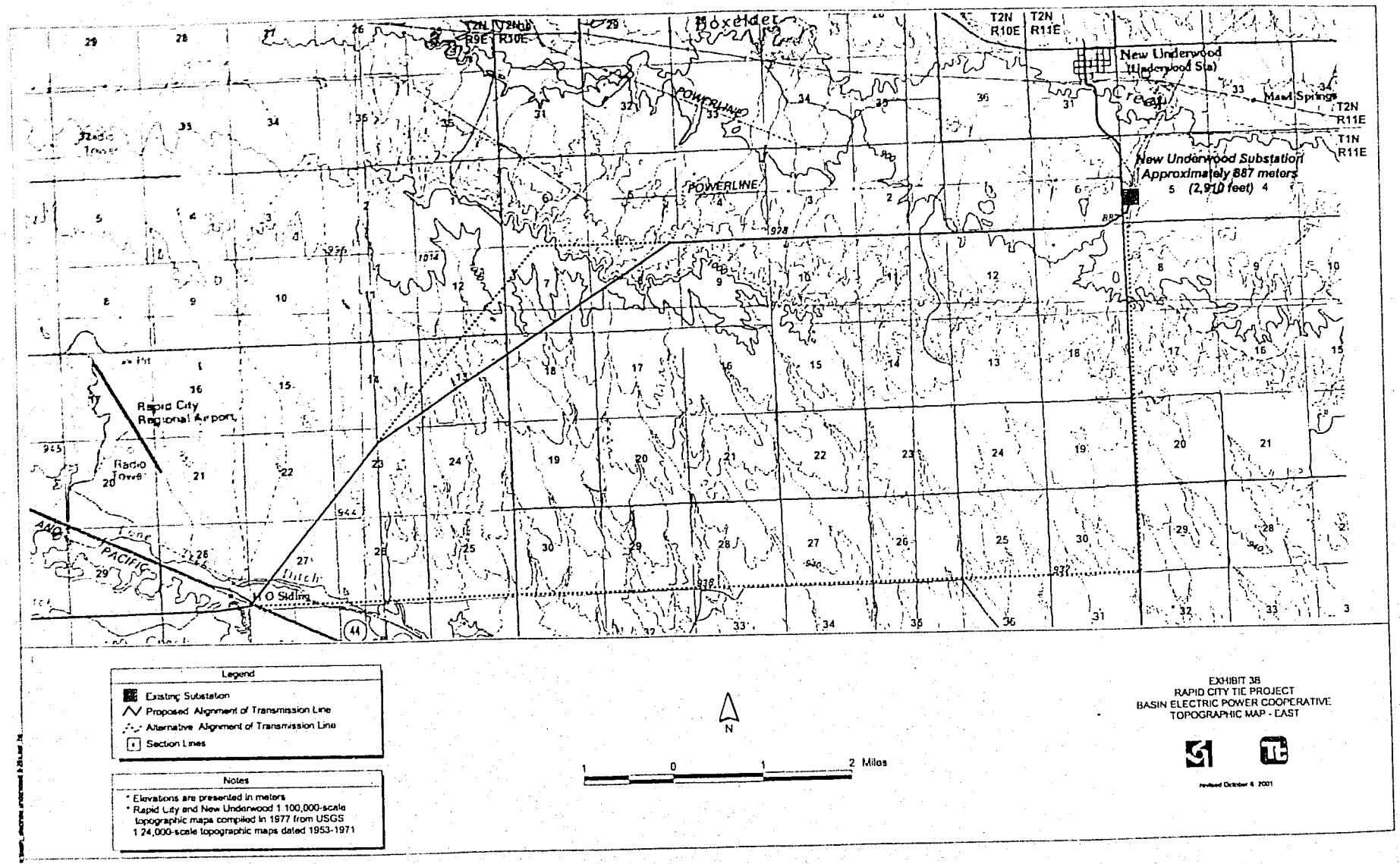
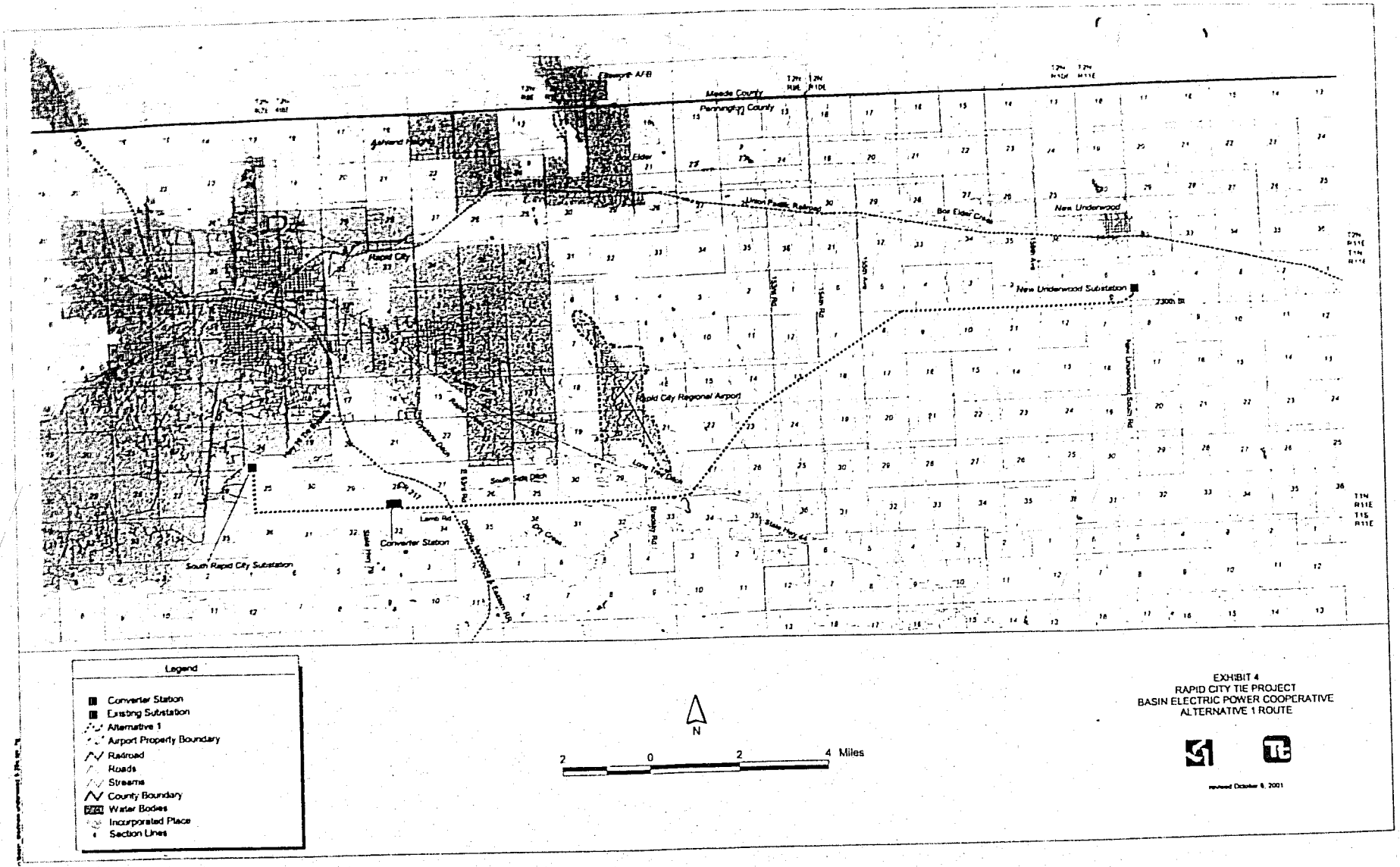


EXHIBIT 3A
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
TOPOGRAPHIC MAP - WEST

Revised October 8, 2021


T2N R9E
T2N R10E
T2N R10E
T2N R11E
New Underwood (Underwood Sta)
Boxelder
POWERLINE
Mawd Springs
T2N R11E
T1N R11E
New Underwood Substation
Approximately 887 meters
(2,910 feet)
Rapid City Regional Airport
Radio Tower
Radio Tower
AND PACIFIC
Lone Tree
Ditch
H O Siding
Legend
Existing Substation
Proposed Alignment of Transmission Line
Alternative Alignment of Transmission Line
Section Lines
Notes
* Elevations are presented in meters
* Rapid City and New Underwood 1:100,000-scale topographic maps compiled in 1977 from USGS 1:24,000-scale topographic maps dated 1953-1971
N
1 0 1 2 Miles
EXHIBIT 3B
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
TOPOGRAPHIC MAP - EAST
Revised October 8, 2001


Legend
Converter Station
Existing Substation
Alternative 1
Airport Property Boundary
Railroad
Roads
Streams
County Boundary
Water Bodies
Incorporated Place
Section Lines
N
2 0 2 4 Miles
Converter Station
South Rapid City Substation
New Underwood Substation
Rapid City Regional Airport
Meade County
Pennington County
Elder
Box Elder Creek
Union Pacific Railroad
Lamb Rd
230th St
EXHIBIT 4
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 1 ROUTE

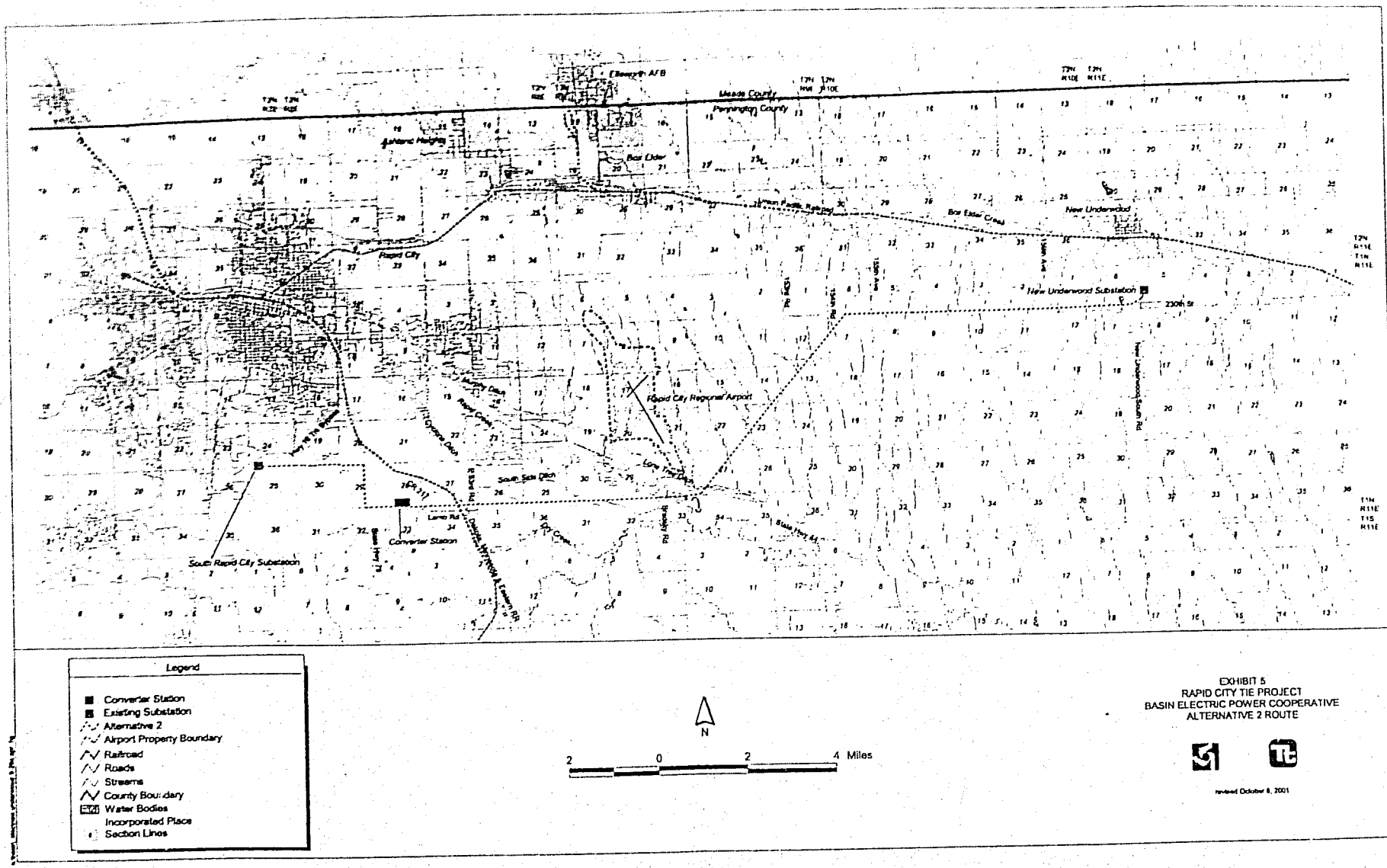


EXHIBIT 5
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 2 ROUTE

revised October 8, 2001

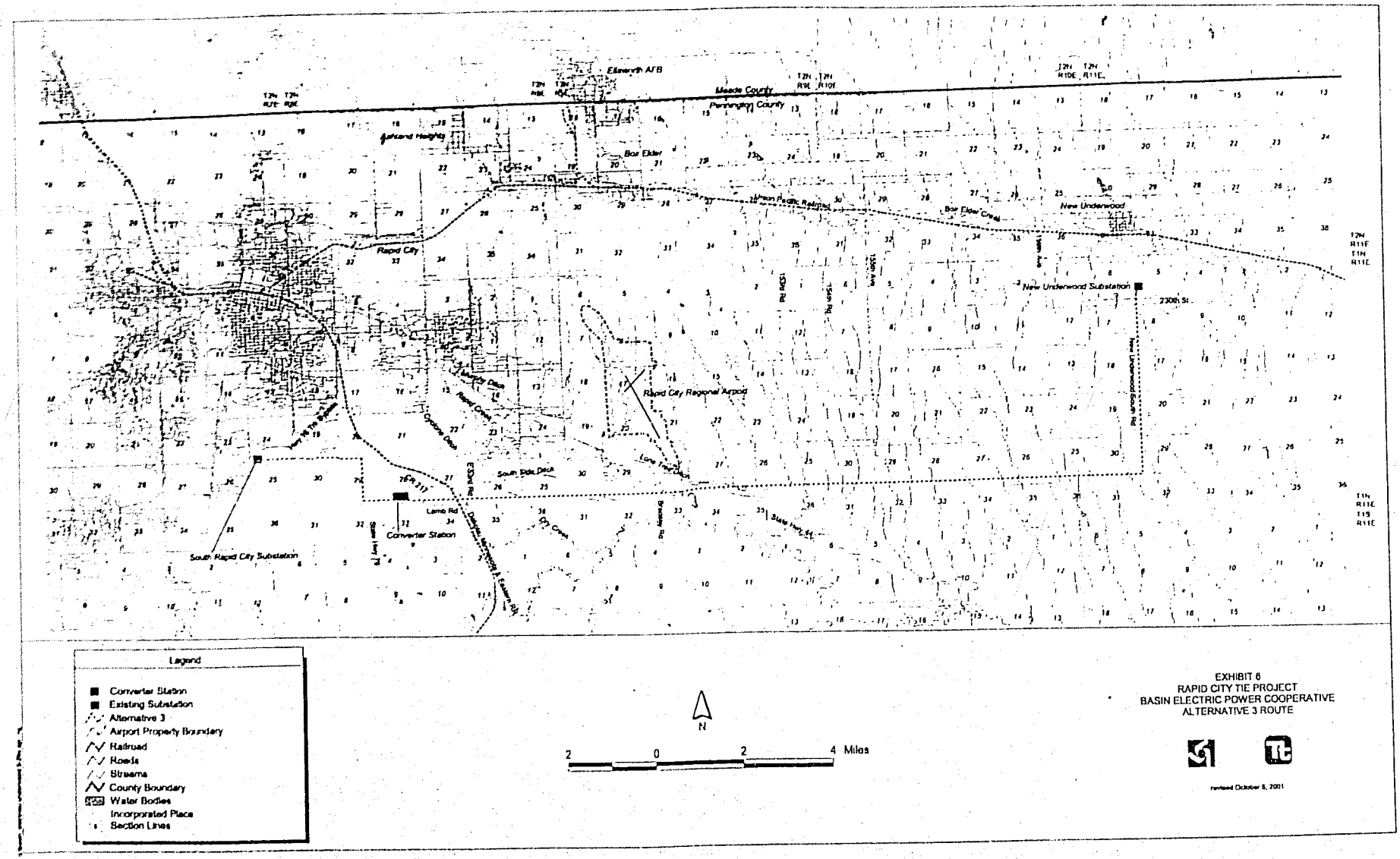
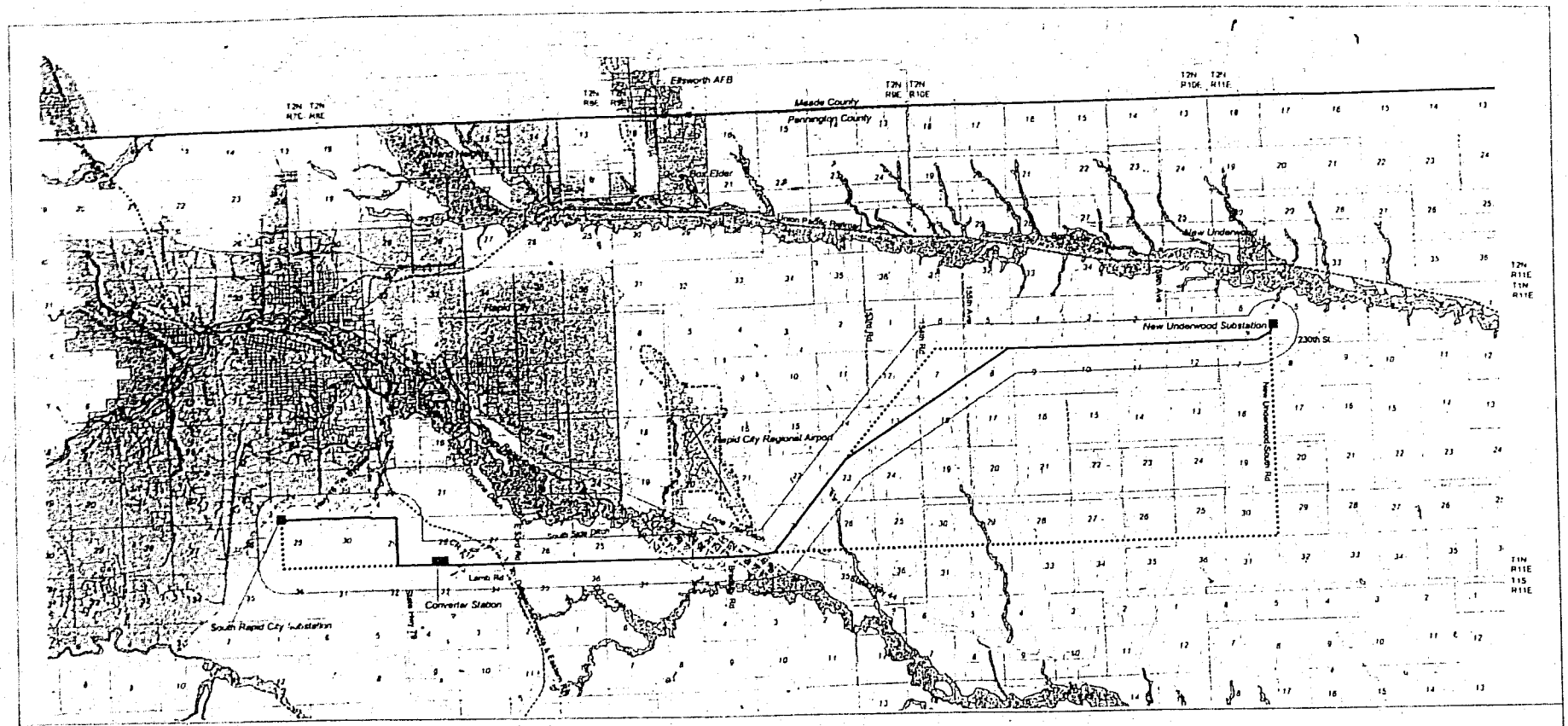


EXHIBIT 6
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 3 ROUTE

revised October 8, 2001



Legend

- 100-year Flood Zone
- 500-year Flood Zone
- Study Corridor
- Existing Substation
- Converter Station
- Proposed Alignment of Transmission Line
- Alternative Alignment of Transmission Line
- Airport Property Boundary
- Railroad
- Roads
- Streams
- County Boundary
- Water Bodies
- Incorporated Place
- Section Lines

Notes

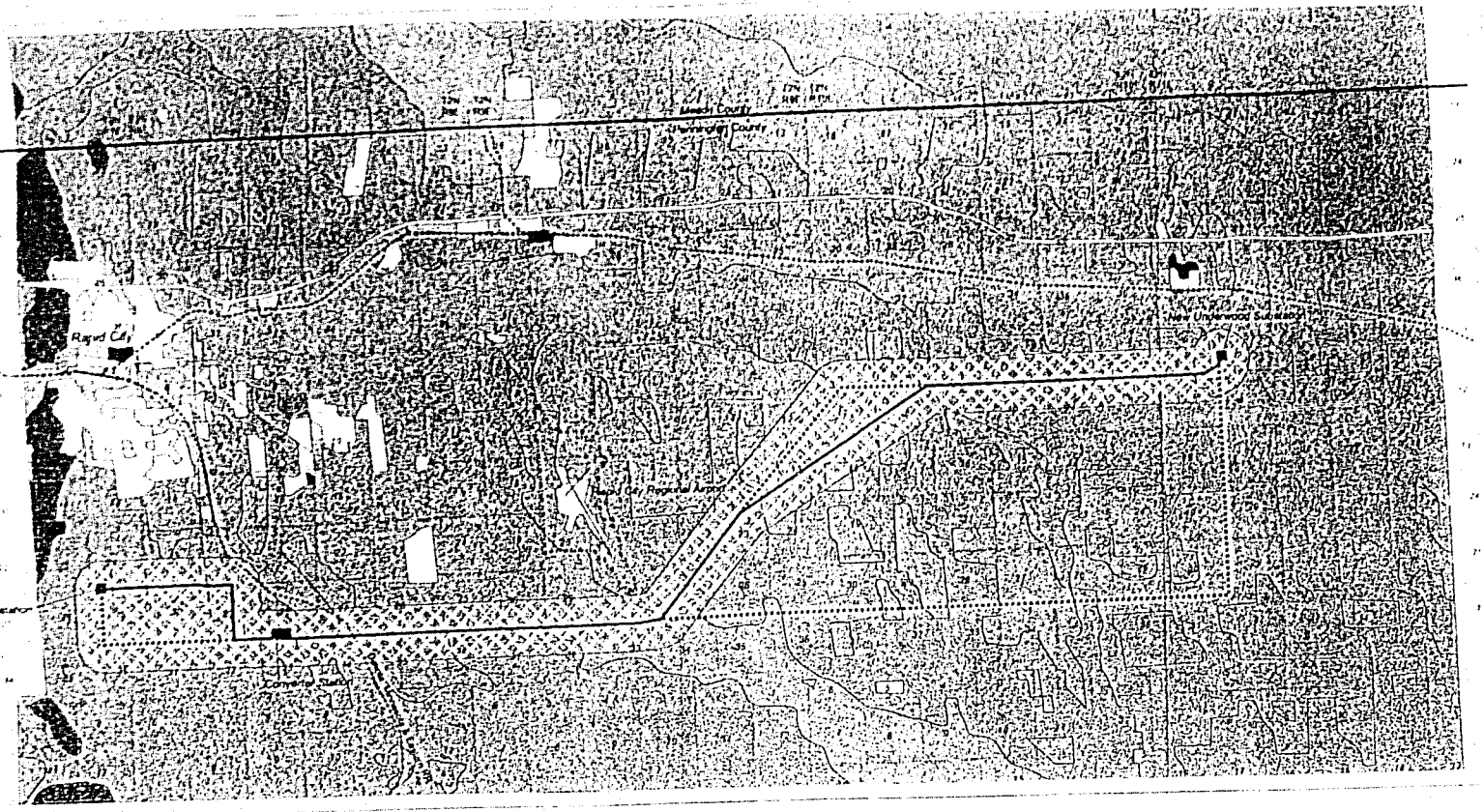
Flood zone data derived from Federal Emergency Management Agency Q3 Flood Data

N

2 0 2 4 Miles

EXHIBIT 7
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
HYDROLOGIC MAP

revised October 8, 2001



Legend

- Commercial and services
- Cropland and pasture
- Forested wetland
- Herbaceous rangeland
- Industrial
- Mixed rangeland
- Nonforested wetland
- Other agricultural land
- Other urban or built-up land
- Reservoirs
- Residential
- Strip mines, quarries, and gravel pits
- Transitional areas
- Transportation, communications, and utilities
- Mixed urban or built-up land
- Evergreen forest land
- Deciduous forest land
- Study Corridor
- Converter Station
- Existing Substation
- Proposed Alignment of Transmission Line
- Alternative Alignment of Transmission Line
- Airport Property Boundary
- Railroad
- County Boundary
- Section Lines

N

2 0 2 4 Miles

Notes

Land use and land cover data derived from United States Geological Survey 1975-78 Rapid City, SD and 1978 Hot Springs, SD Land use series maps published in 1980

EXHIBIT 8
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LAND USE

revised October 6, 2021

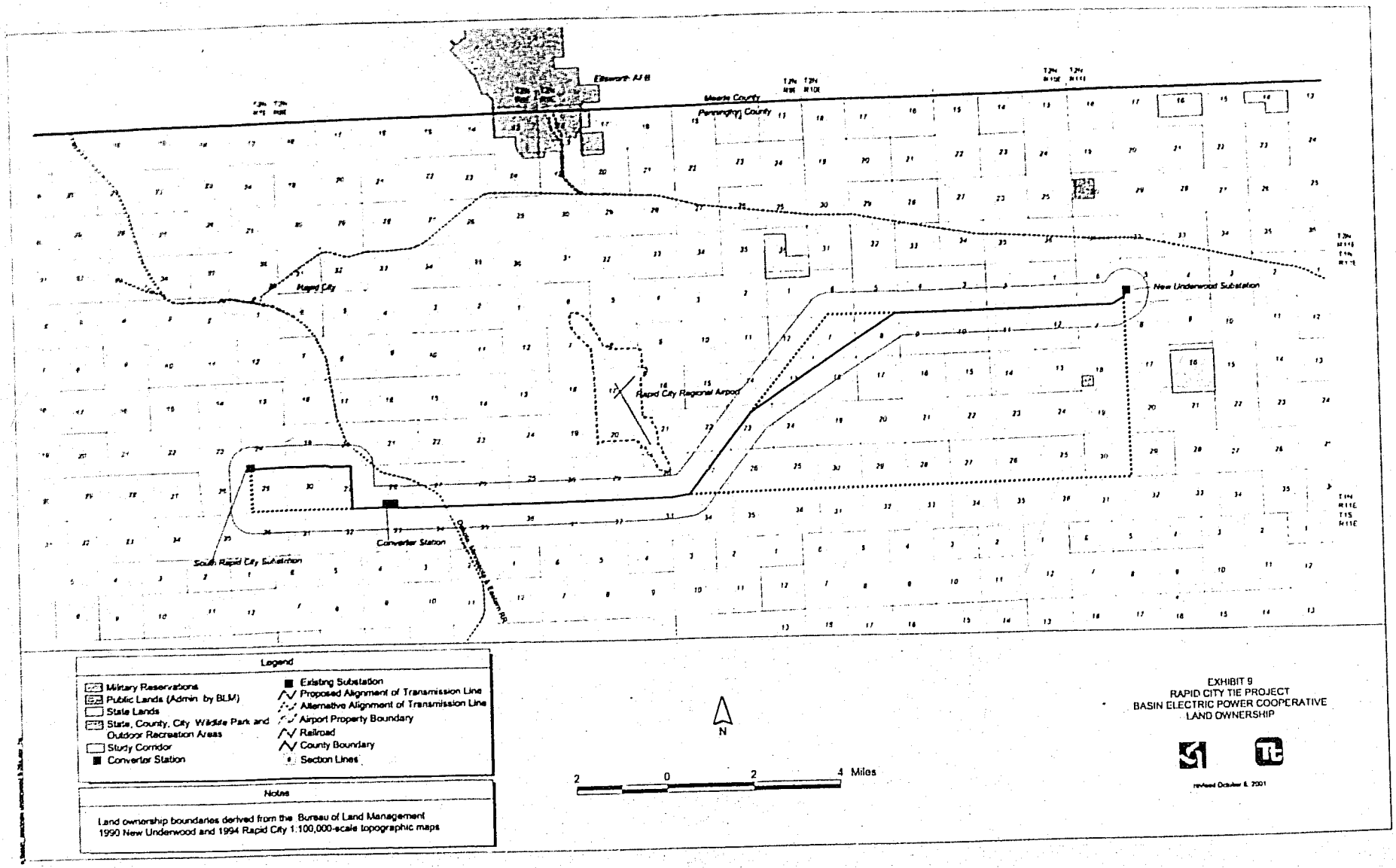


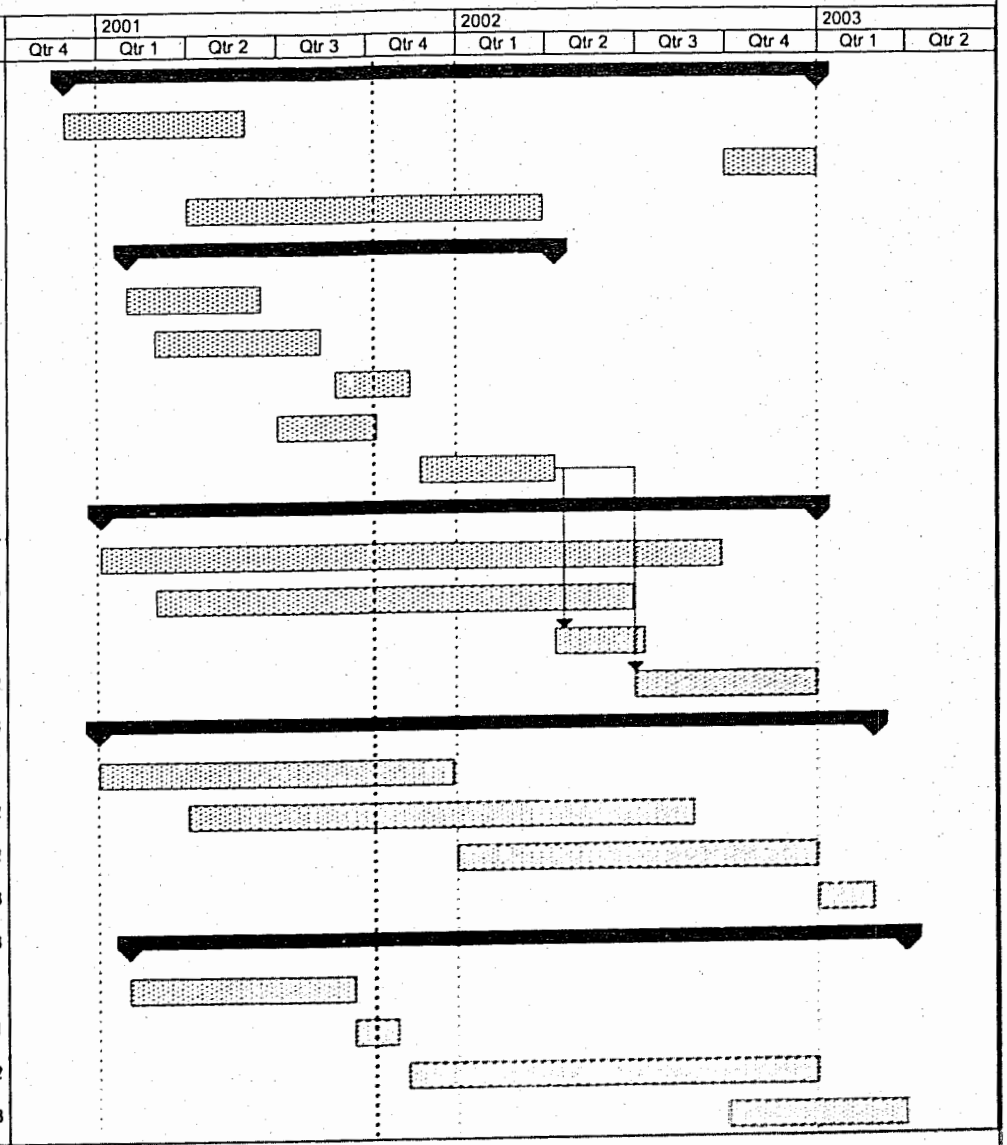
EXHIBIT 9
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LAND OWNERSHIP

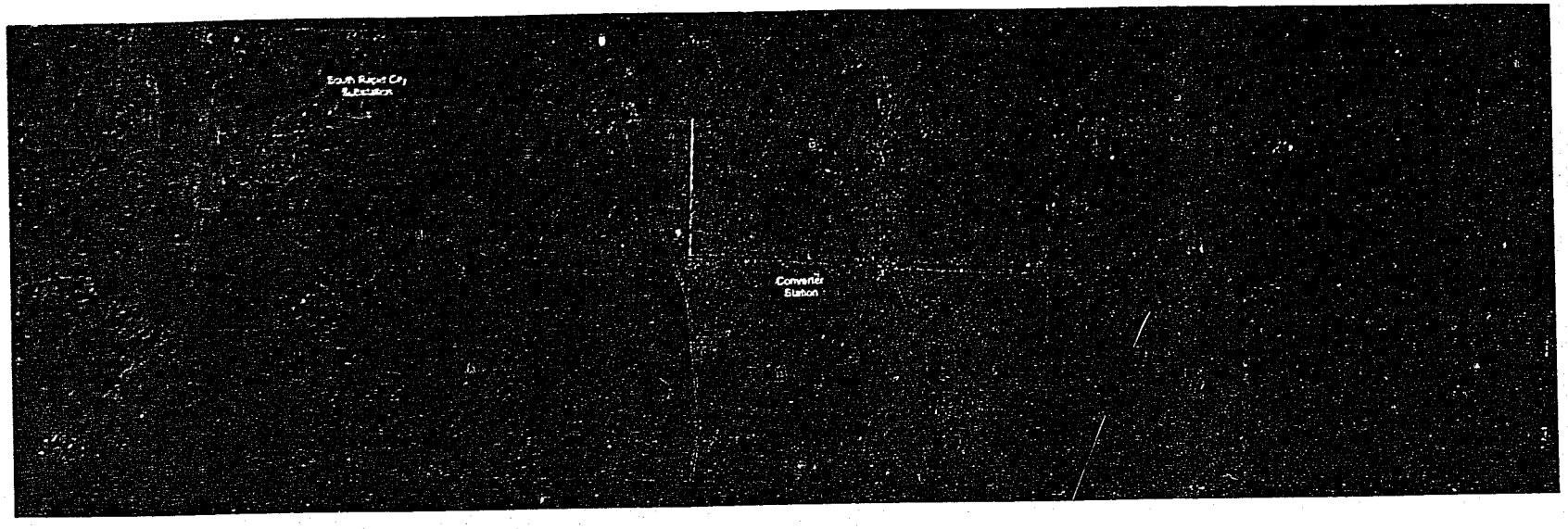
revised October 8, 2001

BASIN ELECTRIC POWER COOPERATIVE

Exhibit 10
Rapid City Tie Project Schedule

ID	Task Name	Duration	Start	Finish
1	**System Studies**	**543 days**	**Fri 12/1/00**	**Tue 12/31/02**
2	LoadFlow, Stability, etc	130 days	Fri 12/1/00	Thu 5/31/01
3	Operational Studies	66 days	Tue 10/1/02	Tue 12/31/02
4	Project Financing	260 days	Mon 4/2/01	Fri 3/29/02
5	**Environmental permits**	**310 days**	**Thu 2/1/01**	**Wed 4/10/02**
6	Field Inspection	97 days	Thu 2/1/01	Fri 6/15/01
7	PrepareAnalysis/Report	120 days	Thu 3/1/01	Wed 8/15/01
8	RUS Review & Approval; FONSI	55 days	Fri 8/31/01	Thu 11/15/01
9	SD PUC Application	74 days	Mon 7/2/01	Thu 10/11/01
10	PUC Hearing & Order	98 days	Mon 11/26/01	Wed 4/10/02
11	**Transmission Line**	**518 days**	**Fri 1/5/01**	**Tue 12/31/02**
12	Design,Specify,Procure, Deliver	451 days	Fri 1/5/01	Fri 9/27/02
13	Acquire Easements	346 days	Fri 3/2/01	Fri 6/28/02
14	"Quick-take" Possession	65 days	Thu 4/11/02	Wed 7/10/02
15	Construction	132 days	Mon 7/1/02	Tue 12/31/02
16	**Western & BHP&L Terminals**	**564 days**	**Tue 1/2/01**	**Fri 2/28/03**
17	Negotiate Interconnections	259 days	Tue 1/2/01	Fri 12/28/01
18	Design, Specify, Procure	370 days	Mon 4/2/01	Fri 8/30/02
19	Construction	261 days	Tue 1/1/02	Tue 12/31/02
20	Checkout & Commission	43 days	Wed 1/1/03	Fri 2/28/03
21	**Converter station**	**564 days**	**Thu 2/1/01**	**Tue 4/1/03**
22	Spec & Bid Preparation	163 days	Thu 2/1/01	Mon 9/17/01
23	Evaluate Bids; Award Contract	34 days	Mon 9/17/01	Thu 11/1/01
24	Manufacture, Deliver, Install	297 days	Mon 11/12/01	Tue 12/31/02
25	Checkout & Commission	129 days	Thu 10/3/02	Tue 4/1/03





Legend
- Converter Station
- Existing Substation
- Proposed Alignment of Transmission Line

N

4000 0 4000 8000 Feet

EXHIBIT 11
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
OVERHEAD PHOTOGRAPH - WEST

Revised October 5, 2021

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

Appendix

LIST OF FIGURES

Figure

TABLE OF CONTENTS (Continued)

LIST OF TABLES

Table

ACRONYMS AND ABBREVIATIONS

Basin Electric	Basin Electric Cooperative Power
BHEC	Black Hills Electric Cooperative
BHP&L	Black Hills Power and Light Company
CBM	Coal Bed Methane
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon monoxide
CRP	Conservation Reserve Program
CWA	Clean Water Act
DGC	Dakota Gasification Company
DM&E	Dakota, Minnesota & Eastern Railroad
EMF	Electric and magnetic fields
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ER	Environmental Report
FC	Federal candidate
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
g	Gravity
G&T	Generation and transmission
GPS	Global Positioning System
kV	Kilovolt
LE	Federally-endangered
LT	Federally-threatened
MDU	Montana-Dakota Utilities
msl	Mean sea level
mva	million volt-amperes
MW	Megawatts
$\mu g/m^3$	Micrograms per cubic meter
NA	Not applicable
NRHP	National Register of Historic Places
NAAQS	National Ambient Air Quality Standards
NESC	National Electrical Safety Code
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NRC	National Research Council
NWI	National Wetland Inventory
PCPI	Per capita personal income
PE	Proposed endangered
PM_{10}	Particulate matter less than 10 microns
POP	Points of Presence
PT	Proposed threatened

Legend

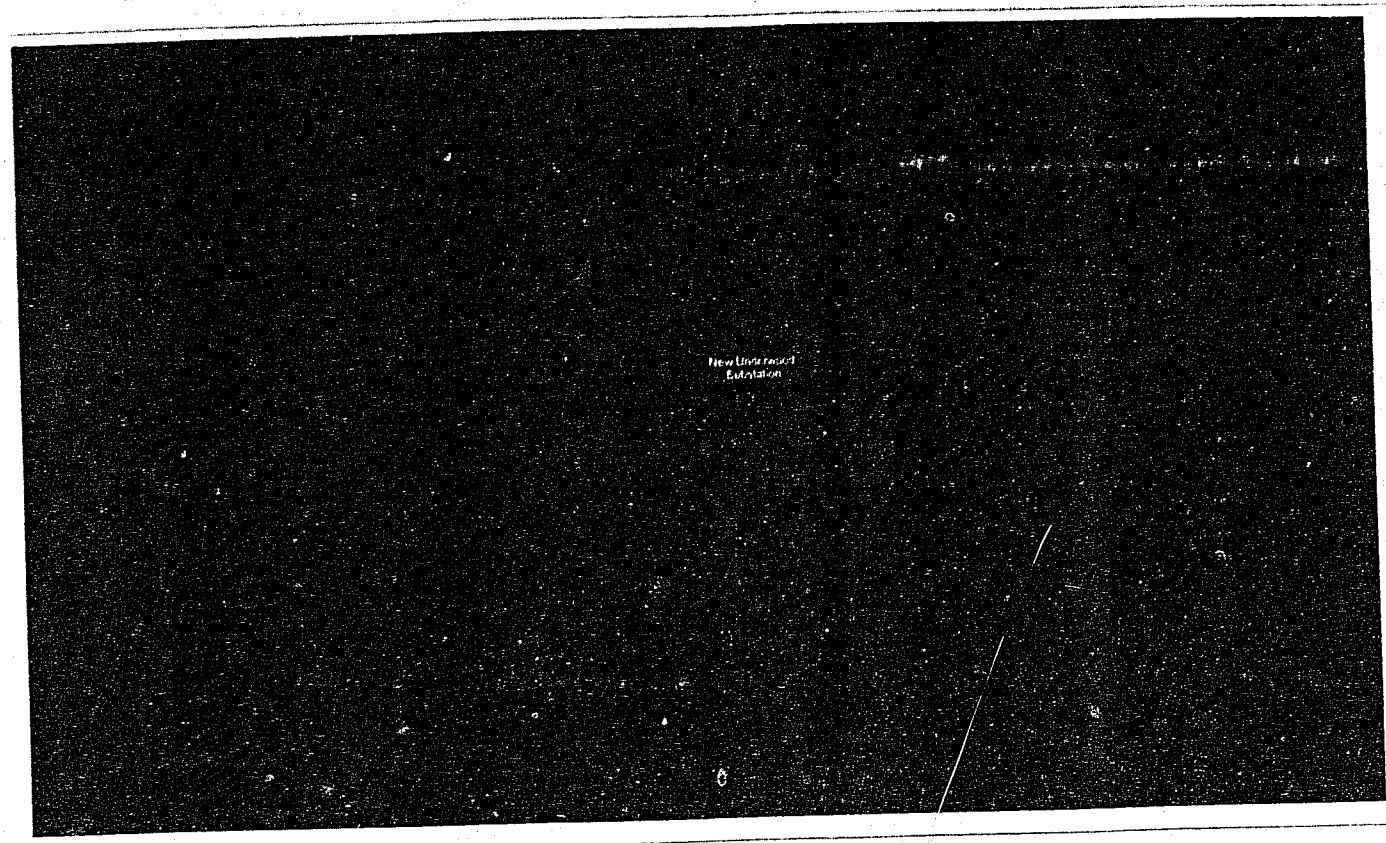
Proposed Alignment of Transmission Line

N

4000 0 4000 8000 Feet

EXHIBIT 12
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
OVERHEAD PHOTOGRAPH - CENTRAL

revised October 4, 2001



Legend

- Existing Substation
- Proposed Alignment of Transmission Line

N

4000 0 4000 8000 Feet

EXHIBIT 13
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
OVERHEAD PHOTOGRAPH - EAST

revised October 5, 2001

EXHIBIT 14
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
LIST OF PREPARERS FOR PUBLIC UTILITIES COMMISSION APPLICATION

Name	Education and Experience	Responsibility
Tetra Tech Core Team		
Robert Hammer	M.S. Meteorology B.S. Meteorology 19 Years Experience	Project Manager
Randy Fox	M.S. Atmospheric Science B.S. Education 18 Years Experience	Assistant Project Manager
Dennis Haag	Certified Wildlife Biologist B.S. Wildlife Science & Range Science 34 Years Experience	Field Investigation Lead, Data Collection
Butch Fries	M.A. Mass Communication B.A. Journalism 23 Years Experience	Technical Editor
June Diller	33 Years Experience	Word Processing, Document Preparation
Heather Giovagnoni	B.A. Geography 2 Years Experience	Maps, Figures
Tetra Tech Technical Specialists		
Jim Bowlby	B.S. Hydrology 23 Years Experience	Geology
Alan Johns	M.S. Environmental Management B.A. Environmental Studies 5 Years Experience	Floodplains, Soils, Field Investigation, Water Resources
Pam Cornelisse	B.S. Biology 4 Years Experience	Vegetation, Field Investigation
Sharon Scheminske	B.S. Environmental Science 1 Year Experience	Air Quality, Socioeconomics
Jennifer Schwarz	M.S. Environmental Science & Engineering B.A. Geology 8 Years Experience	Land Use, Socioeconomics
Arvilla Consulting		
Jim Haag	M.A. Anthropology B.A. History & Sociology 25 Years Experience	Cultural Resources

EXHIBIT 14 (Continued)
RAPID CITY TIE PROJECT
SOUTH DAKOTA PUC APPLICATION
BASIN ELECTRIC POWER COOPERATIVE
LIST OF PREPARERS FOR PUBLIC UTILITIES COMMISSION APPLICATION

Name	Education and Experience	Responsibility
Basin Electric Power Cooperative		
Jim Berg	Certified Professional Geologist B.S. Geology 22 Years Experience	Project Description
Gary Christianson	Registered P.E. B.S. Civil Engineering 30 Years Experience	Project Engineer
James R. Miller	Registered P.E. B.S. Electrical Engineering 39 Years Experience	Project Manager

APPENDIX A

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION
APPLICATION
FOR
RAPID CITY TIE PROJECT

SURVEYED LEGAL DESCRIPTION

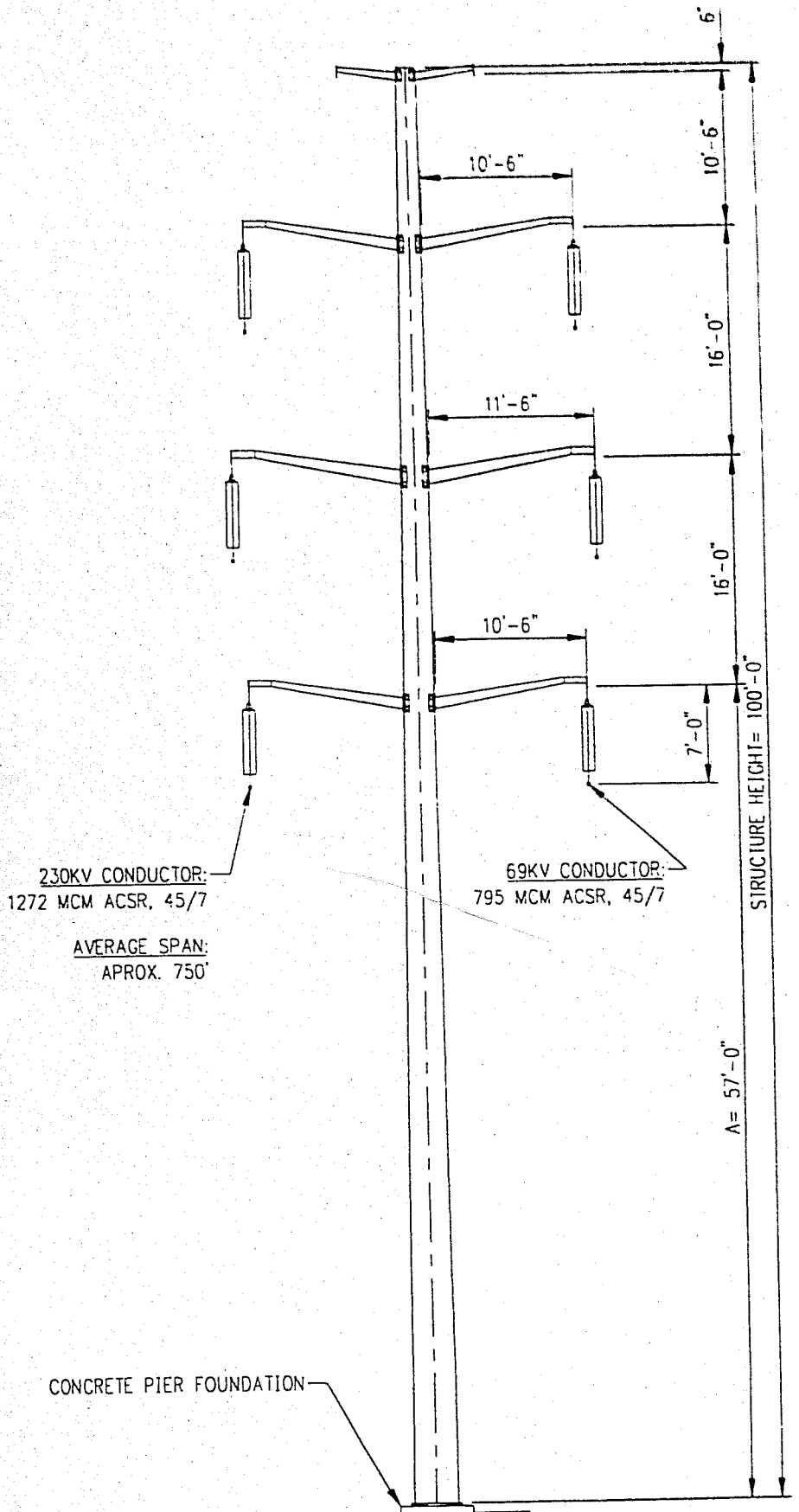
The Surveyed Legal Description for the Rapid City Tie is as follows:

Segment	Bearing	Distance	
Takeoff - AP1	S 79-12-30 E	503.67	
AP1 – AP2	S 87-44-13 E	4544.29	
AP2 – AP3	S 84-46-46 E	843.03	
AP3 – AP4	S 87-51-32 E	553.52	
AP4 – AP5	N 85-03-57 E	500.38	
AP5 – AP6	S 87-29-08 E	2350.95	
AP6 – AP7	S 69-58-59 E	435.64	
AP7 – AP8	S 88-01-17 E	2491.01	
AP8 – AP9	S 02-07-11 W	5156.31	
AP9 – CONV SITE	S 87-54-21 E	3505.05	
IN SITE	S 87-54-21 E	1760.32	
AP12 – AP13	S 75-03-24 E	587.45	
AP13 – AP14	S 87-50-40 E	15339.12	
AP14 – AP15	S 88-09-15 E	16622.35	
AP15 – AP16	N 84-50-27 E	2017.80	
AP16 – AP17	N 41-46-06 E	12444.66	
AP17 – AP18	N 59-36-14 E	21253.36	
AP18 – AP19	S 87-58-22 E	16298.79	
AP19 – AP20	S 88-33-32 E	9492.21	
AP20 – AP21	N 61-56-56 E	1608.85	
AP21 – WAPA	N 17-18-26 E	834.11	End of Project
		119,142.87	(22.56 miles)

APPENDIX B

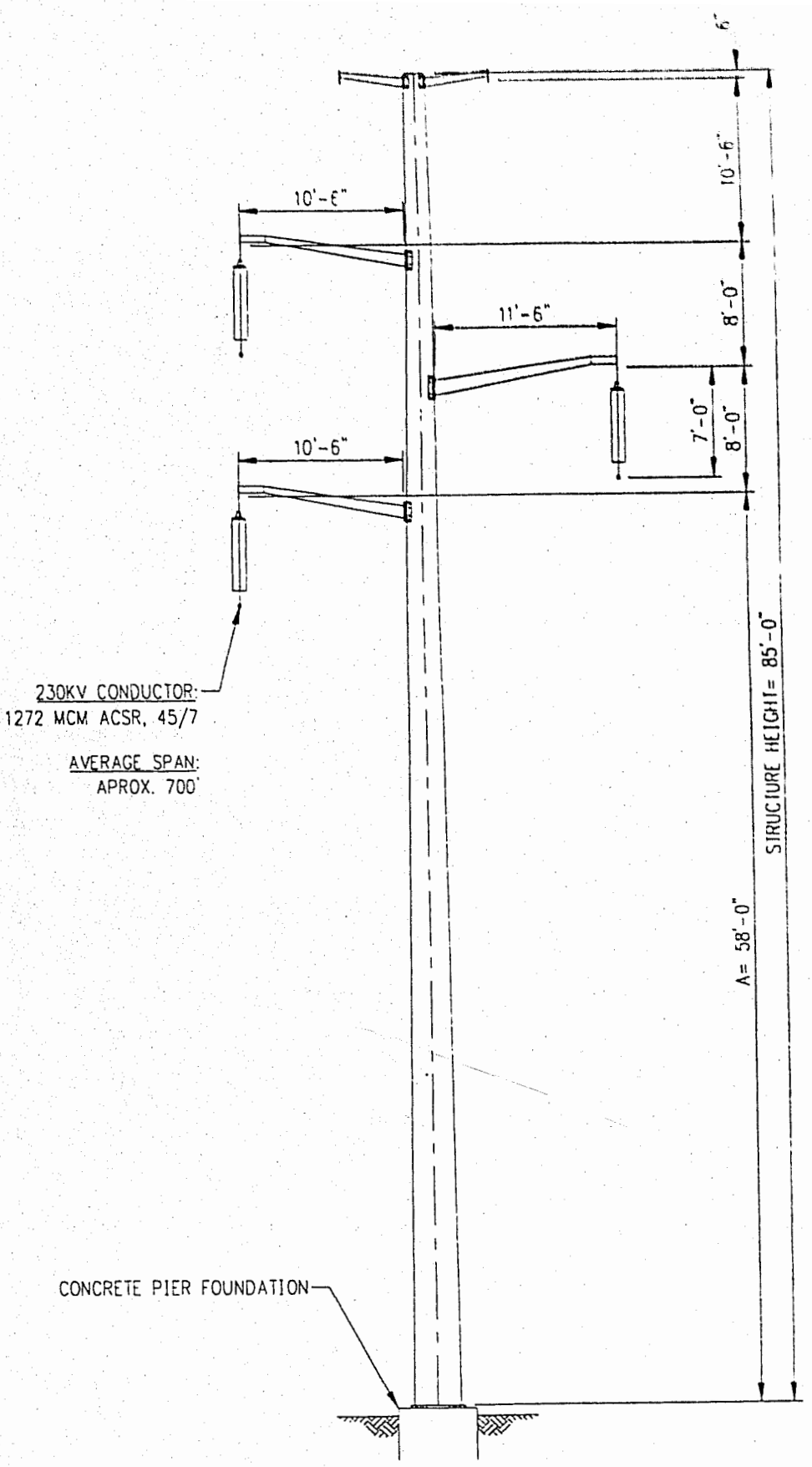
SOUTH DAKOTA PUBLIC UTILITIES COMMISSION
APPLICATION
FOR
RAPID CITY TIE PROJECT

TYPICAL TRANSMISSION LINE STRUCTURE DRAWINGS



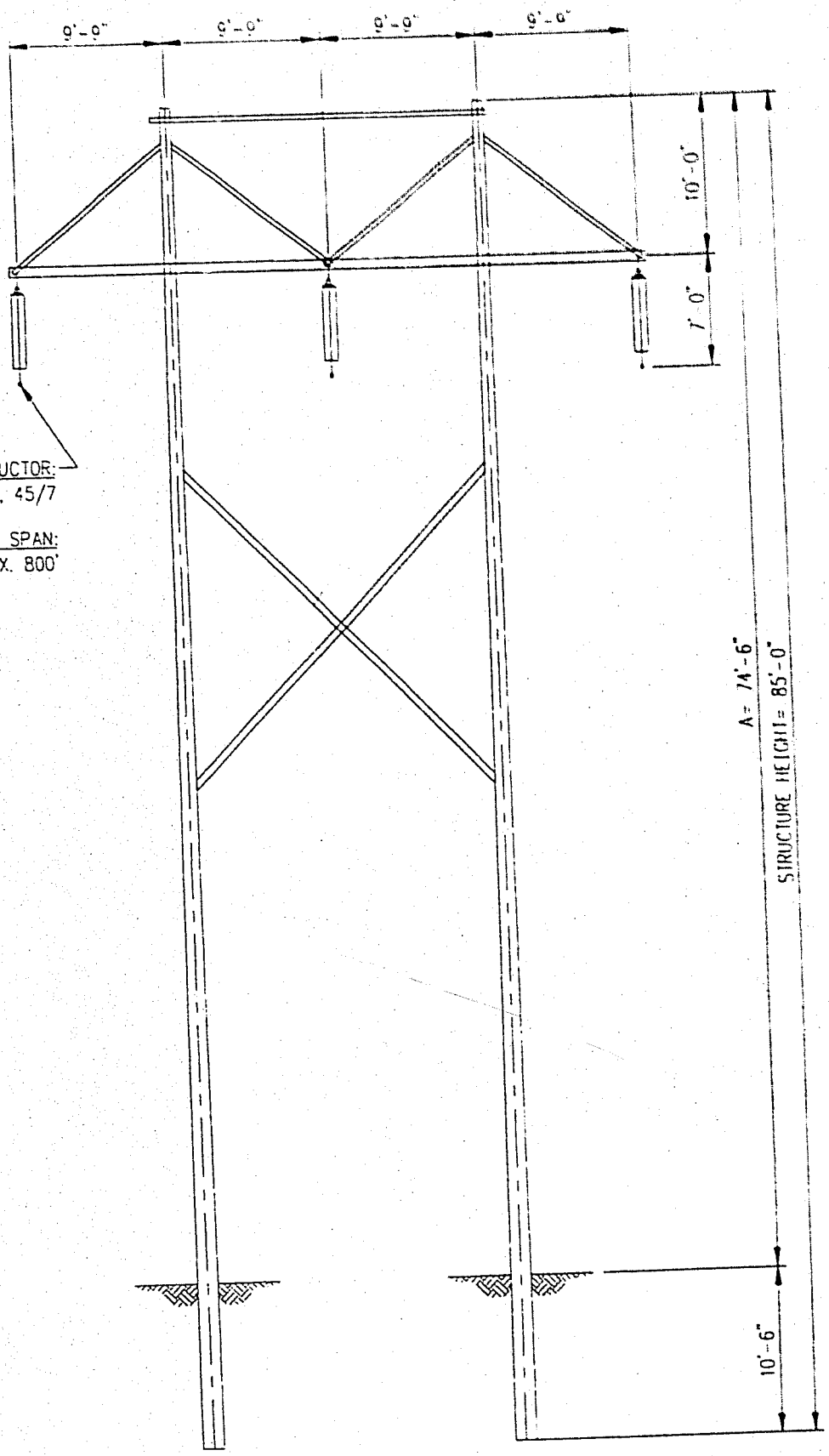
TYPICAL STEEL STRUCTURE

STRUCTURE HEIGHT	"A"
90'	47'
95'	52'
100'	57'
105'	62'
110'	67'
115'	72'



STRUCTURE HEIGHT	"A"
75'	48'
80'	53'
85'	58'
90'	63'

TYPICAL STEEL STRUCTURE
230KV SINGLE CIRCUIT



STRUCTURE HEIGHT	"A"
70'	44.0'
75'	48.5'
80'	53'
85'	57.5'
90'	62.0'

TYPICAL H-FRAME STRUCTURE (WOOD OR STEEL)
230KV SINGLE CIRCUIT

APPENDIX C

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION APPLICATION FOR RAPID CITY TIE PROJECT

ENVIRONMENTAL REPORT

Rapid City Tie Project Environmental Report

October 2001

Prepared for:

U.S. Department of Agriculture
Rural Utilities Service
Engineering and Environmental Section
1400 Independence Ave., SW
Washington, DC 20250-1571

Prepared by:

Basin Electric Power Cooperative
1717 East Interstate Ave.
Bismarck, ND 58501

and

Tetra Tech EM Inc.
4940 Pearl East Circle
Suite 100
Boulder, CO 80301

ACRONYMS AND ABBREVIATIONS (Continued)

Qwest	Qwest Communications International, Inc.
ROW	Right of way
RCRA	Resource Conservation and Recovery Act
RUS	Rural Utilities Service
SD	South Dakota State Highway
SDDENR	South Dakota Department of Environment and Natural Resources
SDDGFP	South Dakota Department of Game, Fish, and Parks
SDNH	South Dakota Natural Heritage
SDNHD	South Dakota Natural Heritage Database
SE	State endangered
SO_2	Sulfur dioxide
ST	State threatened
T&E	Threatened and endangered
Tetra Tech	Tetra Tech EM Inc.
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground storage tanks
VOC	Volatile organic compound
WAPA	Western Area Power Administration
WREA	West River Electric Association

EXECUTIVE SUMMARY

Basin Electric Power Cooperative (Basin Electric) is proposing construction of an asynchronous tie that would connect the eastern and western transmission grids near Rapid City, South Dakota. This project, known as the Rapid City Tie Project, would be in the range of 100 to 300 million volt-amperes (mva), depending on the capabilities of the associated transmission system and whether other utilities participate in the project. Regardless of whether other utilities participate in the project, the scope of the project would not change. The Rapid City Tie Project would include:

- Approximately 23 miles of 230 kilovolt (kV) transmission line
- A line terminal bay at the South Rapid City Substation, at the western end of the project
- An asynchronous tie converter station (converter station) 4 miles southeast of the South Rapid City Substation
- A line terminal bay at the existing New Underwood Substation, at the eastern end of the project

Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota. Construction of the Rapid City Tie Project is required to meet the growing needs for power of Basin Electric's membership in South Dakota and in northeastern Wyoming. Currently, Basin Electric's generation capacity on the western electrical system is inadequate to meet this growing need for electricity, and the transmission system from Basin Electric's existing western interconnected generation fa ilities is inadequate to transmit the required power. As a result, Basin Electric has proposed to build the new Rapid City Tie Project to directly input power from its interconnected eastern generation facilities into this area of South Dakota and Wyoming, where demand for power is growing.

The evaluation of alternatives revealed that the proposed action best addresses the needs of Basin Electric and its customers while minimizing impacts to the environment, existing land uses, concerns of land owners, and regulatory requirements. Although the proposed alignment is not the shortest alternative considered, its accessibility and location, relative to the selection criteria chosen were comparable or superior to other alternatives evaluated. Furthermore, the proposed alignment is compatible with land uses in the region, avoids potentially unfavorable features (such as existing or future residential communities, commercial developments, transportation corridors, and schools), and minimizes the need to cross environmentally sensitive or significant features including wetlands, potentially sensitive habitats, waterways, and vegetation communities.

This review concludes that no significant environmental impacts are anticipated as a result of the Rapid City Tie Project. In addition, the effects that are anticipated can easily be mitigated. Specific conclusions are presented in the paragraphs that follow.

Land Use: The primary land use in this project area consists of ranching and farming: these practices have been changing the landscape for many years. This and future projects should have minimal impacts on land use.

Floodplains: The proposed project is expected to have minimal impacts on floodplains.

Wetlands: The proposed project is expected to have a minimal effect on wetlands. Approximately 2 acres of wetlands are located within the 125 to 133-foot wide proposed project corridor. All wetlands and associated buffer areas crossed by or near the proposed transmission line corridor are narrow (less than 130 feet wide within the corridor) and are located in low areas between hills or draws. Poles for the proposed project typically would be spaced at 750-foot intervals and would be located on hilltops, along ridges, and away from low areas.

Cultural Resources: The proposed project is expected to have minimal impact on cultural resources. Only minor artifacts exist in the study area and can easily be avoided during construction.

Threatened and Endangered Species: The proposed project is expected to have no significant impact on federal and state protected species. During the field reconnaissance, approximately six potential bald eagle roost or feeding trees were identified that may be in the path of the transmission line. Upon a more detailed examination, no bald eagle roosts or nests could be verified at these sites. At this time, there is no evidence that the six trees that may be in the path of the proposed transmission line have been used as roosts or feeding trees for bald eagles. If roosting or nesting bald eagles are encountered during construction, Basin Electric will cease construction activities and work with the U.S. Fish and Wildlife Service (USFWS) to develop a mitigation plan that is appropriate and acceptable.

Fish and Wildlife Resources: The proposed project would have minor direct and indirect impacts on wildlife. Short-term construction noise and activities could affect wildlife by temporarily frightening them from the area. Construction of transmission poles might temporarily displace wildlife because of a short-term loss of habitat. Only small areas in the project corridor would be affected and only minimal portions would be disturbed by installation of poles. The increase in human activity in the project area

might also temporarily disturb wildlife. The addition of the power lines could have long-term impacts by increasing the mortality of birds, raptors, and waterfowl. Construction of the converter station could result in the permanent loss of prairie dog habitat.

Vegetation: Impacts to vegetation are anticipated to be minor and include the effects from farming and ranching, the primary land uses in the project area: As land is developed for residential, commercial, and industrial use, more natural areas will be lost. The area along the project area is mainly rangeland and cropland with urban developments near New Underwood and Rapid City. This and future projects should have an insignificant impact on vegetation, as most areas have been altered from their natural state.

Geologic Resources: No potentially hazardous geologic areas, such as slumps or landslides, would be affected by construction of the converter station or associated power poles and towers. As a result, no direct, indirect, or cumulative impacts to geologic resources are anticipated by the project.

Air Quality: Construction would have no significant long-term direct, indirect, or cumulative impacts on air quality along the utility line corridor. Monitored background values for particulate matter concentrations near the construction corridor do not currently exceed National Ambient Air Quality Standards (NAAQS), and short-term construction activities would not cause these background values to exceed NAAQS in the future. Because construction would not measurably increase background values, the cumulative effect on air quality from construction would be negligible.

Water Quality: Impacts to surface water from the proposed project would be insignificant. All water bodies and associated buffer zones that would be crossed by the transmission alignment are less than 100 fee wide. As a result, the typical constructed pole interval of 750 feet anticipated for the proposed transmission line would enable all water bodies and buffer zones along the alignment of the transmission line to be physically spanned. In addition, no significant direct, indirect, or cumulative impacts to groundwater quality from the proposed transmission line are anticipated.

Aesthetics: The proposed project would have an insignificant effect on aesthetic resources. The project area is characterized by rolling rangelands with a view of the Black Hills west of the project corridor. The view is similar throughout the project area. No scenic viewpoints or scenic roads are in the proposed project corridor. The addition of power lines to the area would have minimal direct or indirect impacts on the already linear features of the landscape, as existing roads, fencing, and power lines transect the area.

Transportation: No significant direct, indirect, or cumulative impacts are expected to the transportation systems of cities, counties, and the state. Short-term impacts may include minor traffic delays caused when wires are strung across roadways or rail lines. Any such short-term roadway or railway closings would be scheduled with appropriate authorities, marked clearly, and detour routes would be provided as necessary. Construction of the proposed project would be expected to cause only insignificant adverse transportation effects to public access as a result of roadway congestion from workers vehicles.

Noise and Interference with Radio and Television: Noise associated with construction of the proposed transmission line and converter station and removal of existing structures and power lines would be intermittent and of relatively short duration. The majority of the proposed project is located in rural, unpopulated areas. Direct and indirect impacts from noise associated with construction and operation of the proposed project would be small compared with vehicles on nearby highways and other roadways, the Rapid City Regional Airport, and farm equipment. In addition, the proposed project is not expected to contribute significantly to cumulative noise impacts within the project corridor.

Interference with radio and television signals could occur in vehicles driving near, or homes located near, the transmission lines. However, interference is expected to be limited since radio and television interference generally occurs in older transmission lines with loose or dirty insulators and spark gaps. Basin Electric's policy is to investigate and correct problems with television and radio interference associated with its lines.

Other Factors: The proposed project is anticipated to have minimal or no effect on human health and safety, population, economic conditions, and environmental justice.

1.0 DESCRIPTION OF PROJECT

Basin Electric Power Cooperative (Basin Electric) is proposing construction of an asynchronous tie that would connect the eastern and western transmission grids near Rapid City, South Dakota (Figure 1-1). This project is known as the Rapid City Tie Project.

The rating of the tie would be in the range of 100 to 300 million volt-amperes (mva), depending on the capabilities of the associated transmission system and whether other utilities participate in the project. Regardless of whether other utilities participate in the project, the scope of the project would not change. The Rapid City Tie Project would include:

- Approximately 23 miles of 230 kilovolt (kV) transmission line
- A line terminal at the South Rapid City Black Hills Power and Light Substation (South Rapid City Substation), at the western end of the project
- An asynchronous tie converter station (converter station) 4 miles southeast of the South Rapid City Substation
- A line terminal bay at the existing New Underwood Substation, at the eastern end of the project

The subsequent subsections describe the potential routes as well as the two substations and proposed new converter station. Figure 1-2 presents the proposed project route.

1.1 TRANSMISSION LINE

The route of the transmission line would extend east from the South Rapid City Substation to the converter station and to the existing New Underwood Substation and would consist of approximately 23 miles of 230 kV transmission line.

The preferred route for the proposed 230 kV transmission line would begin at the South Rapid City Substation and extend directly east along a section line for 2.25 miles. The proposed 230 kV transmission line would then intersect an existing 69 kV transmission line that has a north-south orientation and is owned by Black Hills Electric Cooperative (BHEC). The proposed 230 kV transmission line would turn south at the intersection for approximately 1 mile and would be double-circuited with the 69 kV transmission line to the next section line, a point near South Dakota State Highway (SD) 79. The proposed 230 kV transmission line along with the existing 69 kV transmission line would then turn east

(continuing the double circuit) and extend along the north side of the section line for more than 0.75 mile where the proposed 230 kV transmission line would enter the proposed converter station. The proposed 230 kV transmission line would then exit the east side of the proposed converter station just north of the section line, then it would cross to the south side and parallel the section line for about 6.5 miles to a point just south of SD 44. The proposed 230 kV transmission line would double-circuit with the existing 69 kV transmission line for about 1.5 miles of this 6.5-mile segment. Within the 6.5-mile segment, the line would cross Dry Creek (two crossings); a Dakota, Minnesota & Eastern Railroad (DM&E) line; Cyclone Ditch; South Side Ditch; and Rapid Creek. From the point just east of Rapid Creek and south of SD 44, the proposed 230 kV transmission line would turn approximately 45 degrees northeast and extend 2.5 miles, crossing Lone Tree Ditch and Murphy Ditch. The proposed 230 kV transmission line would then turn approximately 20 degrees east-northeast and extend approximately 4 miles to a point along the section line. The proposed 230 kV transmission line would then extend directly east along the south side of the section line for approximately 5 miles to a point just west of a north-south section line. The final portion of the proposed 230 kV transmission line would extend approximately 0.33 mile northeastward and enter the existing New Underwood Substation.

The proposed transmission line would consist of single-pole and two-pole structures for the western portion of the route, until it reaches the angle point near Highway 44; two-pole and three-pole, H-frame structures comprise the balance of the route. Single-pole structures would also support a 69 kV circuit owned by a member of Rushmore Electric, which in turn is a member of Basin Electric. Portions of an existing 69 kV line would be removed and replaced by the new double-circuit line.

1.2 SOUTH RAPID CITY SUBSTATION

Black Hills Power and Light Corporation (BHP&L) is an investor-owned utility that owns the South Rapid City Substation located near the southern edge of Rapid City, 0.5 mile south of the Interstate Highway 16 Truck Bypass and 1 mile east of Interstate Highway 16. The western portion of the proposed project would include construction of a bay within the South Rapid City Substation. The line terminal bay at the South Rapid City Substation would be designed and constructed concurrently with and match the balance of the facility.

1.3 CONVERTER STATION

The proposed converter station would be located approximately 4 miles southeast of the South Rapid City Substation, along the route of the 230 kV transmission line, and is owned by Basin Electric. The converter station property would comprise approximately 40 acres and would involve a total disturbance of up to 30 acres. It would consist of outdoor and indoor electrical equipment. Outdoor equipment would include concrete foundations, steel structures, electrical insulators, and equipment such as transformers, switches, circuit breakers, and capacitor banks. Converter equipment would be housed indoors. The size, shape, and components of the converter equipment and the building required to house it vary depending on the manufacturer. Potential suppliers and their proposals are being evaluated.

1.4 NEW UNDERWOOD SUBSTATION

The Western Area Power Administration (WAPA) is an agency of the U.S. government that owns the New Underwood Substation located slightly more than 1 mile south of the town of New Underwood, South Dakota. The eastern portion of the project includes construction of a bay in the New Underwood Substation. The line terminal bay at the New Underwood Substation would be designed to match and coordinate with existing facilities.

1.5 GENERAL TOPOGRAPHIC FEATURES OF THE PROJECT

The elevation of the proposed corridor for the proposed project ranges from 3,540 feet (1,079 meters) above mean sea level (msl) in the west to 2,910 feet (887 meters) above msl in the east. The terrain in the region is relatively flat with some rolling hills.

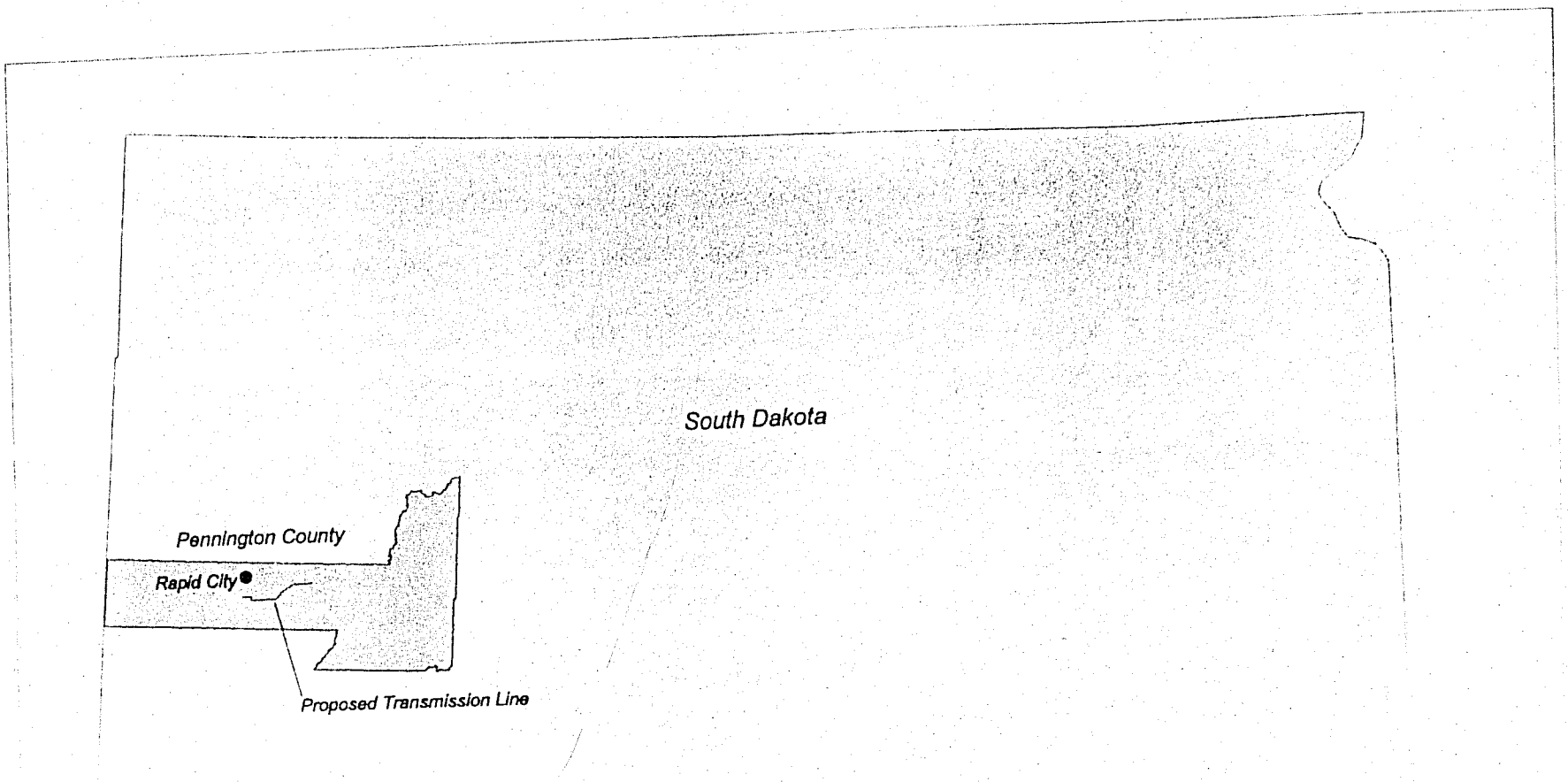


FIGURE 1-1
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
AREA MAP

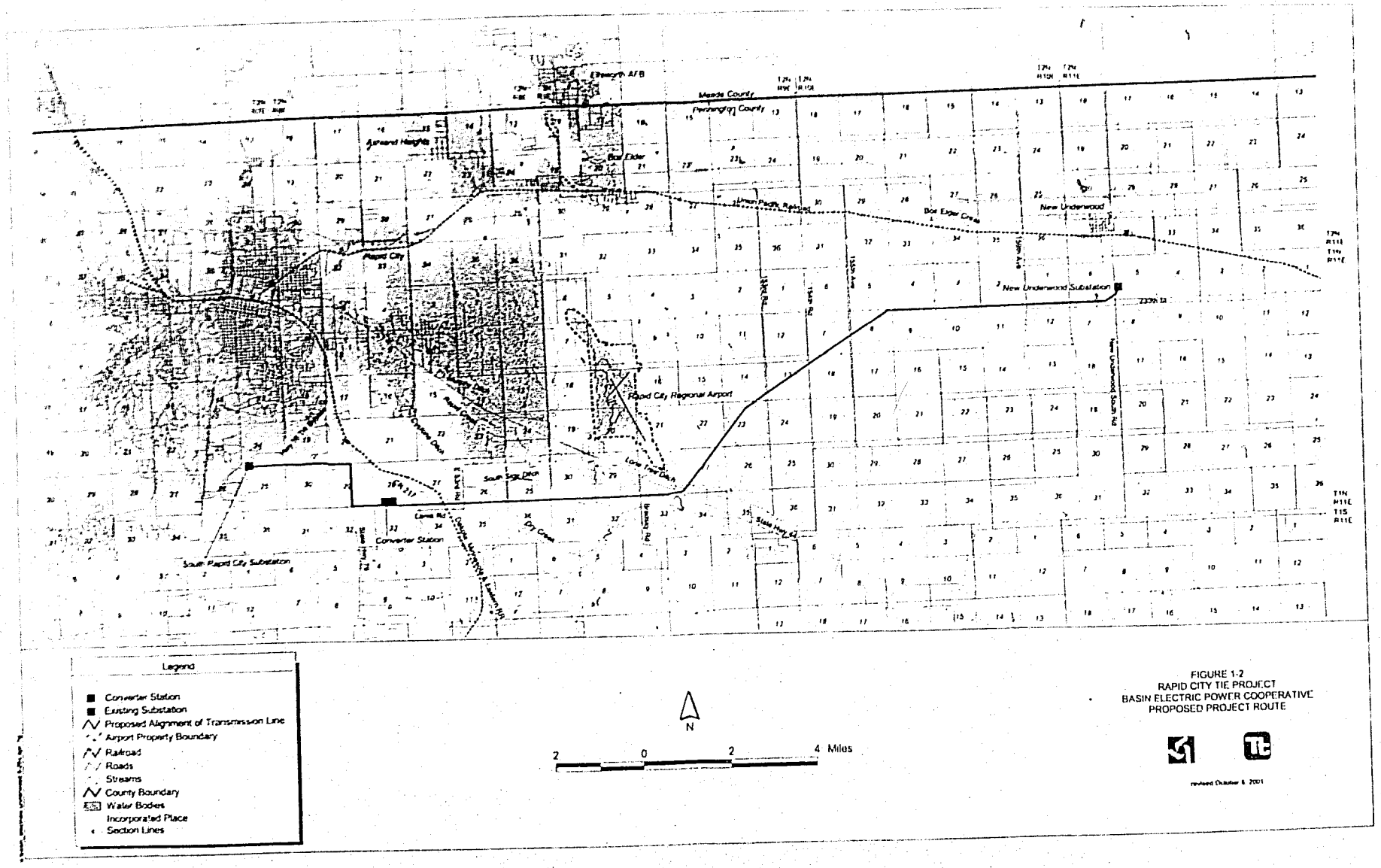


FIGURE 1-2
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PROPOSED PROJECT ROUTE

revised October 8, 2001

2.0 NEED FOR THE PROJECT

Basin Electric is a consumer-owned, regional cooperative headquartered in Bismarck, North Dakota. It generates and transmits wholesale electricity to 120 member rural electric systems in nine states: Colorado, Iowa, Minnesota, Montana, Nebraska, New Mexico, North Dakota, South Dakota, and Wyoming. These member systems, in turn, distribute electricity to about 1.7 million consumers.

Basin Electric was formed in 1961 by 67 member cooperatives, after the U.S. Department of the Interior announced that the federal hydropower system would not be able to meet the additional energy requirements of the region's rural electric cooperatives and other preference customers of the U.S. Bureau of Reclamation beyond the winter of 1965. Basin Electric was formed as a wholesale power supplier to plan, design, construct, and operate generating facilities necessary to meet the growing electrical demands of its member systems.

Currently, the majority of Basin Electric's 120 members fall into one of two classes of membership: Class A and Class C. Basin Electric's 16 Class A members purchase wholesale power directly from the cooperative under contract. Class A members can be generation and transmission (G&T) or retail distribution systems. The G&T systems, in turn, provide wholesale power to electric retail distribution systems. Of these Class A members, eight are distribution cooperatives, and eight are G&T cooperatives. (A G&T cooperative is engaged primarily in providing wholesale electric service to its members, which generally consist of several distribution cooperatives. Service by a G&T member is provided from its own generating facilities or through agreements to purchase power with other wholesale power suppliers.)

Basin Electric has 102 Class C members. These are member cooperatives that construct, operate, and maintain electric retail distribution systems. Class C members are the retail distributors of electricity that is sold by Class A G&T members under power supply contracts.

Construction of the Rapid City Tie Project and associated 23 miles of 230-kV transmission line is required to meet the growing needs for power of Basin Electric's membership in South Dakota and in northeastern Wyoming. This project was established on the basis of a growing need to address reliability and to supply power to rapidly expanding cooperative loads near Rapid City. A portion of this growing need for power is a result of the Coal Bed Methane (CBM) extraction process currently occurring in the Powder River Basin in northeastern Wyoming. CBM production experts have estimated that 65,000 to

120,000 CBM wells will be drilled in the Powder River Basin during the next 20 to 30 years. Each of these wells and the associated pipeline compression facilities will require new electrical service.

Currently, Basin Electric's generation capacity on the western electrical system is inadequate to meet this growing need for electricity, and the transmission system from Basin Electric's existing western interconnected generation facilities is inadequate to transmit the required power. As a result, Basin Electric has proposed to build the new Rapid City Tie Project to directly input power from its interconnected eastern generation facilities into this area of South Dakota and Wyoming, where demand for power is growing.

Basin Electric operates 3,323 megawatts (MW) of generating capacity. The cooperative owns 2,370 MW of this capacity for its member systems. Basin Electric has six direct and two second-tier subsidiaries. Its two major subsidiaries are Dakota Gasification Company (DGC) and Dakota Coal Company. DGC owns and operates the Great Plains Synfuels Plant in Beulah, North Dakota. The plant produces natural gas and byproducts from coal through the gasification process. Dakota Coal provides financing for and markets all the lignite produced from the Freedom Mine, also near Beulah.

3.0 ALTERNATIVES TO THE PROPOSED PROJECT

This section describes all reasonable alternatives to the proposed action that were considered for further evaluation and explains the reasons alternatives were rejected. It also describes the No Action Alternative.

3.1 DEVELOPMENT OF ALTERNATIVES

Basin Electric conducted a systematic evaluation of alternative routing for the proposed project to select the most feasible alignment. Basin Electric's corridor evaluation included:

- Studying the entire proposed area of the project using aerial photographs, maps, and existing land use databases
- Screening the area of the project to identify restricted and potentially incompatible areas, including conflicting land uses, existing structures or developments, and potentially challenging environmental features such as ponds, lakes, or hills
- Identifying alternative corridors that are predominantly along existing Public Land Survey section lines between the existing South Rapid City and New Underwood substations
- Completing field surveys by a multidisciplinary team including a project engineer, environmental compliance specialist, and land use planner
- Meeting with several landowners along various alternative corridors to identify potential conflicts and incompatibilities and to assess the probable level of cooperation
- Conducting a comparative assessment of selected environmental corridors using criteria on environmental, land use, engineering, and cost evaluation considerations
- Identifying the preferred corridor for the proposed Rapid City Tie Project based on consideration of the above factors

3.1.1 Selection Criteria

An initial screening process followed by a field reconnaissance identified potential alternatives to the proposed project. The initial task involved: (1) delineation of the boundaries of the project area relative to the proposed endpoints of the alignment, and (2) examination of aerial photographs, maps of existing and future land uses, transportation and utility maps, and maps that show environmental features including floodplains, wetlands, and soils. This initial review was completed to eliminate from further consideration areas that are obviously unsuitable as a site for the transmission line. Based on the results

of the screening evaluation, acceptable sections and nodes of the corridor were identified, drawn on a map, and combined into route alignments. Alternative alignments were evaluated through field reconnaissance and screened against specific evaluation criteria.

Screening criteria that contributed to the selection of the proposed transmission line alignment included:

- Minimization of the length of the corridor
- High accessibility for construction and maintenance
- Minimization of the number of permits required for construction and operation
- Minimization of visual impacts
- Siting in area without zoning restrictions and away from recreational and residential developments
- Minimization of the number of homes and buildings adjacent to the corridor
- Minimization of the number of properties the transmission line would cross
- Minimization of potential impacts to known wetlands, threatened and endangered (T&E) species, sensitive habitats, waters of the U.S., and other environmental resources
- Willingness of property owners to sell rights of way (ROWs)
- Minimization of costs associated with ROW acquisition, construction, and maintenance
- Optimization of the line's benefits to Basin Electric and its customers
- Elimination of alignments more than 25 miles long
- Elimination of alignments that did not predominantly coincide with section lines, existing property boundaries, and utility ROWs to comply with "agency" requests that these areas be avoided, where possible

Individual weighting factors were assigned to each of the above criteria to standardize the relative degree of importance and were summed for each alternative alignment to provide an estimate of the potential benefits each offered.

3.1.2 Alternatives Considered But Eliminated from Further Study

The following three alternative routes were identified and evaluated:

- Alternative 1 – A route south of the South Rapid City Substation for 1 mile and then eastward, crossing SD 79 and connecting with the preferred route.

- Alternative 2 – A route described as the projection of the diagonal section from the crossing with SD 44 northeastward until it intersects with a projection westward of the east-west section from the New Underwood Substation.

- Alternative 3 – A route directly east from the crossing with SD 44 to a point across the highway south of New Underwood and then northward into the New Underwood Substation.

Figures 3-1, 3-2, and 3-3 show these alternative routes. The following sections present detailed descriptions of the three alternative routes.

Alternative 1

Alternative 1 would require moving slightly westward from the South Rapid City Substation takeoff structure to position the route on the east side of and parallel to the existing BHP&L 230 kV transmission line. The existing line is located adjacent to the edge of the section line. The route would proceed south for 1 mile and then turn east and parallel the section line on its south side for about 2.5 miles until it connects with the preferred route just east of SD 79.

Alternate 1 was evaluated and found to have the following disadvantages:

- The terrain is rough. The existing line crosses several large ravines and uses long-span, dead-end structures on each side. Similar structures would be required for the proposed line. Single-pole structures, which may be more aesthetically pleasing and are planned for this area to coordinate with ongoing suburban development, would be inappropriate for much of Alternative 1 because of the rugged terrain.

- Exiting the South Rapid City Substation presented additional problems and costs. At least two large angle structures would be required to site Alternative 1 against the existing 230 kV line. Moving the route adjacent to the existing line was assumed to be essential to minimize potential damage to future land use for Section 25.

- An existing 69 kV line is already located in the south portion of the alternative. Double-circuiting that line with the proposed 230 kV line would be necessary to acquire the ROW. Alternative 1 would require an additional 1.5 miles of double-circuit structures.

- ROW procurement would be challenging because the land in this area is considered to have significant potential for development and subdivision. BHP&L had already purchased and made available for this project an easement directly east of the South Rapid City Substation. The route ROW eastward from the easement area was adjacent to the Rapid City landfill site and deemed suitable and more "buyable."

Alternative 2

Alternative 2 continues the diagonal from SD 44 northeastward until it intersects with the east-west route from the New Underwood Substation. The alternative crossed higher ground in the northwest quarter of Section 13 before it passed west and north of residences in the southwest corner of Section 12. After it turns eastward, the route would pass below the "breaks" into lower terrain in Section 7. The landowner of Section 13 raised considerable objection to Alternative 2. He has future plans for a homesite in the northwest quarter. Terrain is the highest in the northwest quarter, which offers views to the south and west. The landowner did not want the area severed by a transmission line. He proposed the route instead across the southern portion of the section. The preferred route accommodates his request. Alternative 2 was abandoned primarily because the landowner objected.

Alternative 3

Alternative 3 is an extension eastward of the preferred east-west route along the section line west of SD 44. The alternative would cross SD 44 and continue eastward 10 miles until it crosses the blacktop road south of New Underwood. Just west of WAPA's 230 kV transmission line, the alternative would turn northward, paralleling the WAPA line until it enters the substation, about 4.5 miles.

Alternative 3 was evaluated and found to have the following disadvantages:

- The alternative added about 2.5 miles to the length of the transmission line over the preferred route, which would increase the cost and environmental impact.
- The alternative route crossed significantly more crop and hayland areas than the proposed route. The proposed route avoids this land to the extent possible.
- Two additional farmsteads would be affected by this route.

3.2 ALTERNATIVES TO THE PROPOSED ACTION

There are no reasonable alternatives to the Proposed Action other than the No Action Alternative.

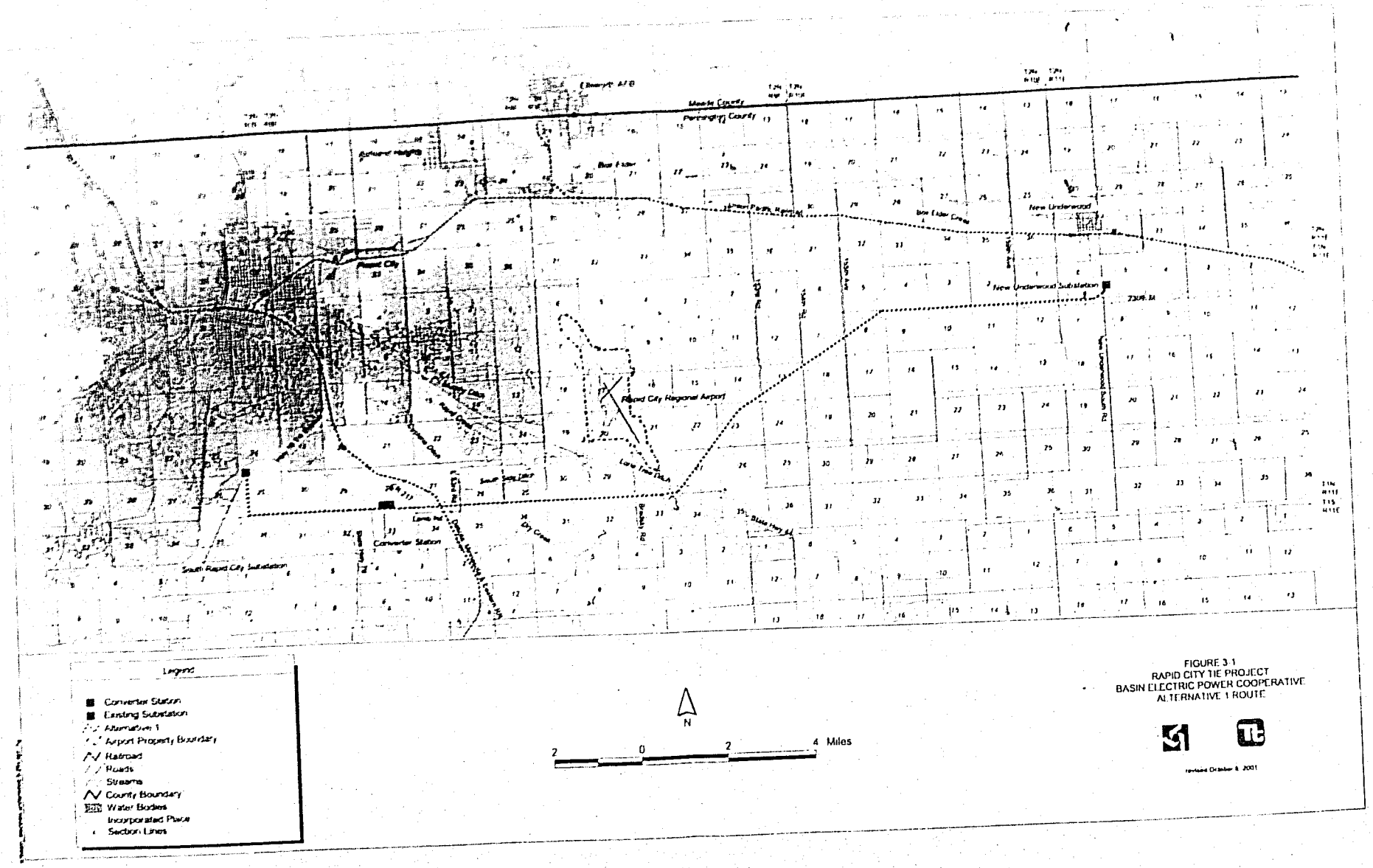


FIGURE 3-1
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 1 ROUTE

revised October 8, 2001

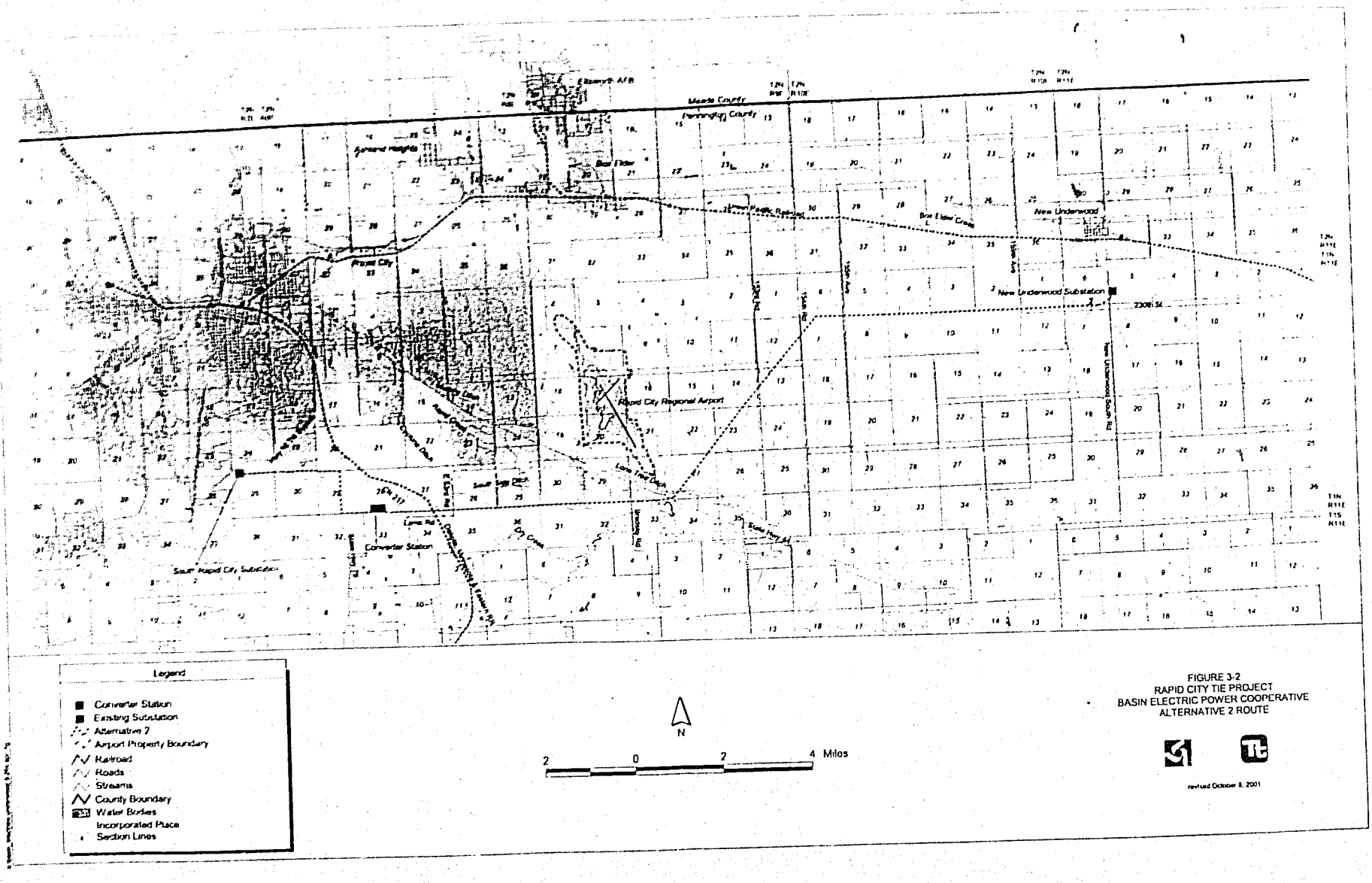


FIGURE 3-2
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 2 ROUTE

revised October 8, 2001

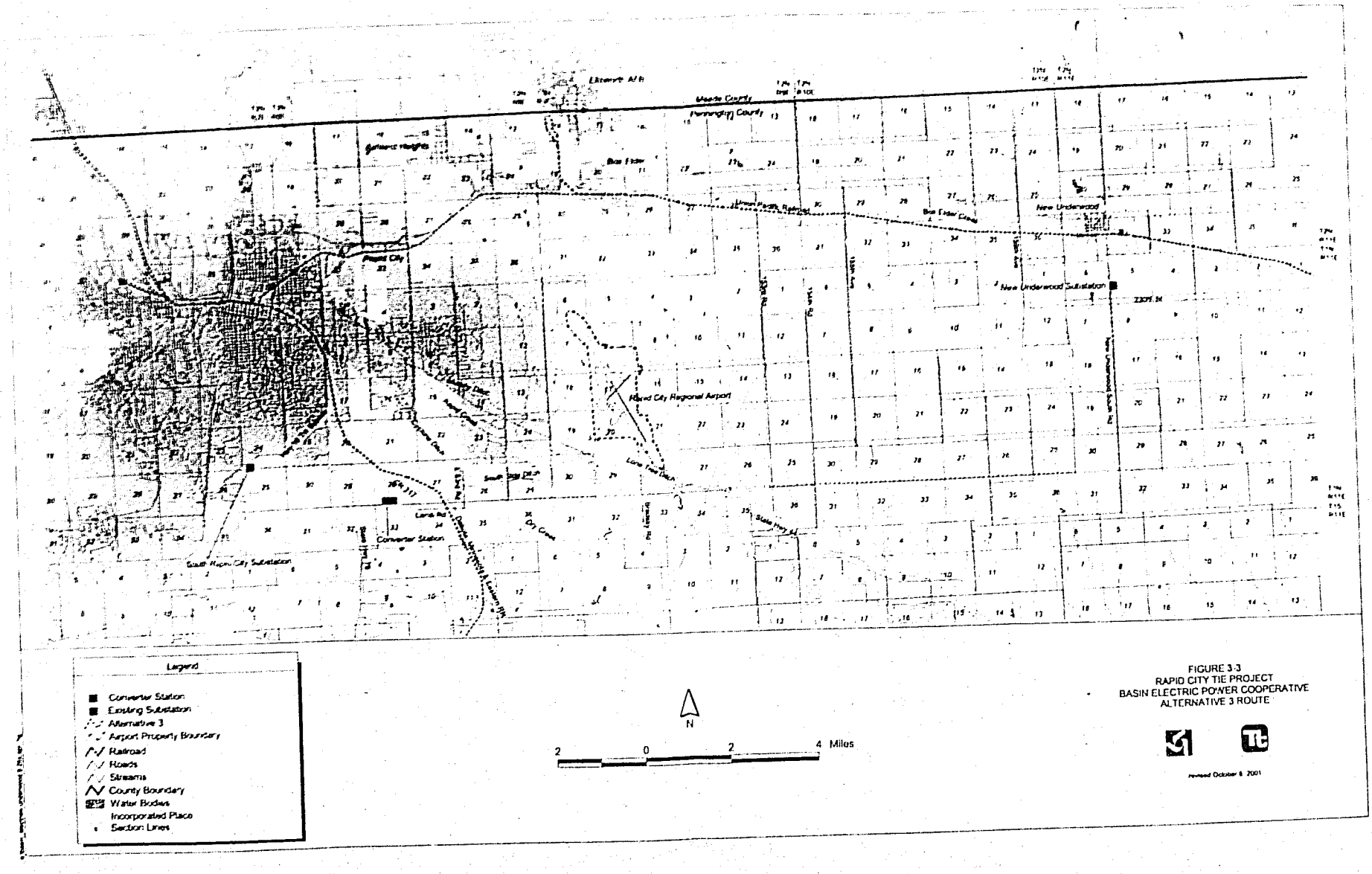


FIGURE 3-3
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
ALTERNATIVE 3 ROUTE

Revised October 8, 2001

3.3 NO ACTION ALTERNATIVE

The No Action Alternative would forego permitting construction of a transmission line and bay in the new South Rapid City Substation. No change would be made to resources in the study area and no effects would be expected.

3.4 SUMMARY OF ALTERNATIVES

The evaluation of alternatives revealed that the Proposed Action described in Section 3.5 best addresses the needs of Basin Electric and its customers while minimizing impacts to the environment, existing land uses, concerns of land owners, and regulatory requirements. Although the proposed alignment is not the shortest alternative considered, its accessibility, location, and scoring relative to the selection criteria chosen were comparable or superior to other alternatives evaluated. Furthermore, the proposed alignment is compatible with land uses in the region, avoids potentially unfavorable features (such as existing or future residential communities, commercial developments, transportation corridors, and schools), and minimizes the need to cross environmentally sensitive or significant features including wetlands, potentially sensitive habitats, waterways, and vegetation communities.

3.5 PROPOSED ACTION

Figures 3-4A and 3-4B show the proposed action with topography as a background feature. The western terminal of the project involves construction of a bay in the South Rapid City Substation adjacent to the southern edge of Rapid City, 0.5 mile south of SD 79 and 1 mile east of Interstate Highway 16 (Figure 1-2).

The preferred route for the proposed 230 kV transmission line would begin at the South Rapid City ' ubstation and extend directly east along a section line for 2.25 miles. The proposed 230 kV transmission line would then intersect an existing 69 kV transmission line that has a north-south orientation and is owned by BHEC. The proposed 230 kV transmission line would turn south at the intersection for approximately 1 mile and would be double-circuited with the 69 kV transmission line to the next section line, a point near SD 79. The proposed 230 kV transmission line along with the existing 69 kV transmission line would turn east (continuing the double circuit) and extend along the north side of the section line for more than 0.75 mile where the proposed 230 kV transmission line would enter the proposed converter station. The proposed 230 kV transmission line would then exit the east side of the proposed converter station just north of the section line, then it would cross to the south side and parallel

the section line for about 6.5 miles to a point just south of SD 44. The proposed 230 kV transmission line would double-circuit with the existing 69 kV transmission line for about 1.5 miles of this 6.5-mile segment. Within the 6.5-mile segment, the line would cross Dry Creek (two crossings); a DM&E railroad line; Cyclone Ditch; South Side Ditch; and Rapid Creek. From the point just east of Rapid Creek and south of SD 44, the proposed 230 kV transmission line would turn approximately 45 degrees northeast and extend 2.5 miles, crossing Lone Tree Ditch and Murphy Ditch. The proposed 230 kV transmission line would then turn approximately 20 degrees east-northeast and extend approximately 4 miles to a point along the section line. The proposed 230 kV transmission line would then extend directly east along the south side of the section line for approximately 5 miles to a point just west of a north-south section line. The final portion of the proposed 230 kV transmission line would extend approximately 0.33 mile northeastward and enter the existing New Underwood Substation.

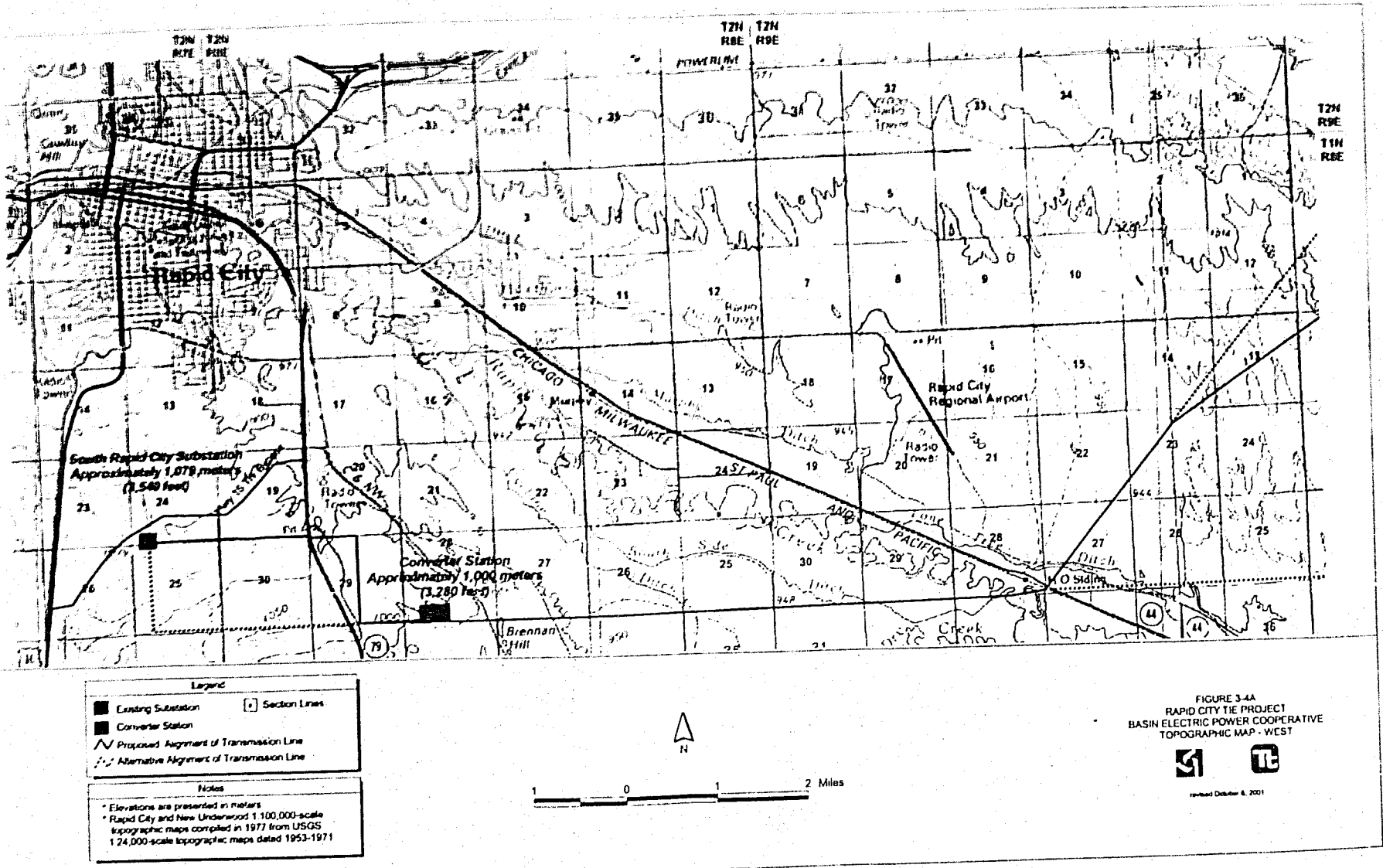


FIGURE 3-4A
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
TOPOGRAPHIC MAP - WEST

revised October 8, 2001

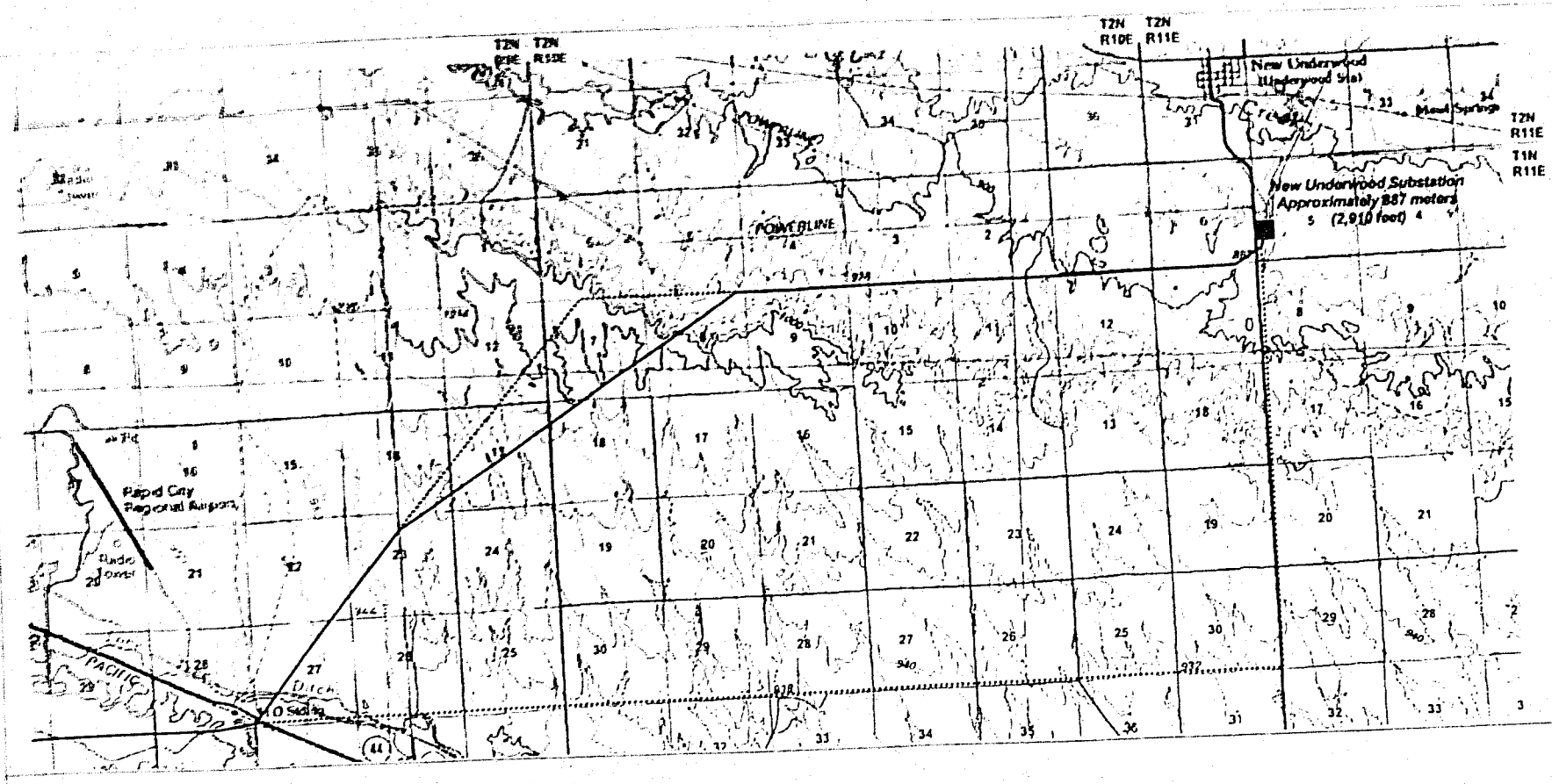


FIGURE 3-4B
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
TOPOGRAPHIC MAP - EAST

revised October 8, 2001

4.0 AFFECTED ENVIRONMENT

This section describes the human environment of the study area for the Rapid City Tie Project. The baseline information provided in this section allows evaluation of potential environmental impacts that could result from the proposed project and alternatives. As stated in Title 40 Code of Federal Regulations (CFR) Part 1508.14, the human environment includes natural and physical resources and their relationship to people.

For the proposed project, each potentially affected environmental resource is addressed in terms of a study area. Appendix A presents 23 photographs of the study area.

For all resources, the proposed project corridor is defined as the 100- to 133-foot wide alignment (depicted as a red line on figures in this report) where the transmission line would be constructed. However, the study area is defined for each resource by the physical extent that could be affected by the proposed action. For most resources, the study area includes 0.5-mile-wide area on each side of the centerline of the proposed transmission line and the converter station. However, the study areas for certain resources vary based on the prevalence or scarcity of the resource in the region, its size and dispersion, its sensitivity to local disturbance, and the nature and amount of information available on the resource.

The study areas for each resource and the reasoning used in the selection process are presented in Table 4-1. The length of the study area is the entire length of the corridor (0.5 mile west of the proposed BHP&L substation to 0.5 mile east of the existing New Underwood Substation), unless specified otherwise. For the proposed converter site, the study area is the entire 40-acre parcel. Table 4-1 presents the study areas for the proposed action, Alternative 1, and Alternative 2. A study area was not delineated for Alternative 3 because this alternative was eliminated from consideration prior to conducting extensive field work.

Specific environmental resources in the proposed corridor are described in the following sections.

4.1 LAND USE

This section describes the land use in the affected environment and includes general and agricultural land use and formally classified lands. The study area for land use is delineated as a corridor the length of the proposed transmission line and 0.5 mile on either side of the center line of the transmission line.

TABLE 4-1

RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
STUDY AREA BY ENVIRONMENTAL RESOURCE

Environmental Resource	Study Area
Land Use	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Floodplains	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Wetlands	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Cultural Resources	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Threatened and Endangered Species	Pennington County
Fish and Wildlife Resources	Pennington County
Vegetation	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Geology, Topography, and Soils	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Coastal Areas	Not applicable to this project
Air Quality and Climatology	Pennington County
Water Resources	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Aesthetics	Area within which the proposed facilities may be visible
Transportation	Project corridor and nearby airport
Noise and Radio and Television Interference	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Human Health and Safety	One-half mile wide area on each side of the center line of the proposed transmission line and converter station site
Socioeconomic Conditions and Community Resources	Pennington County

Figure 4-1 shows land use in and around the project corridor. Figure 4-2 supplements the evaluation of land use by showing land ownership in and around the project corridor. Figure 4-2 also shows that the project corridor does not cross federal land.

4.1.1 General Land Use

The proposed transmission line and converter station would cross a diverse landscape with a mixture of land uses, including: dry land and irrigated cropland; range land; streams, irrigation canals; riparian corridors; designated 100-year floodplains; stock ponds; urban and rural residential areas; industrial land; various transportation corridors; animal feedlot corrals; grain bin storage; salvage yards; the flight path for the Rapid City Regional Airport; a highway maintenance yard; a sanitary landfill; and existing substations located on the eastern and western ends of the project. The proposed transmission line would cross several transportation corridors including SD 79, SD 44, and the DM&E railroad line. The proposed transmission line would traverse 99 percent private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances.

4.1.2 Agriculture

Ranching is the principal enterprise in the proposed project area. Cattle and sheep are the primary sources of income for many ranchers; cash crops are a secondary source. Alfalfa, tame grasses, and forage sorghum provide a source of winter feed for most ranches (USDA 1990). Winter wheat and alfalfa hay are the primary cash crops and the main source of income for most farms (USDA 1990, 2001a). Many cash crop farmers also manage cattle or sheep for a secondary source of income (USDA 1990).

Table 4-2 shows that the number of acres of farmland decreased in Pennington County between 1987 and 1997. However, during the same years, the number of farms in Pennington County increased slightly, although the average size per farm decreased (USDA 2001a). No land in Pennington County is classified as prime farmland (USDA 2001a).

4.1.3 Formally Classified Lands

The proposed corridor does not contain land that is administered by federal or state governments. Ellsworth Air Force Base is located 3.5 miles north of the proposed corridor and is the closest federally administered land. The proposed corridor does not cross Conservation Reserve Program (CRP) lands (Tetra Tech 2001a).

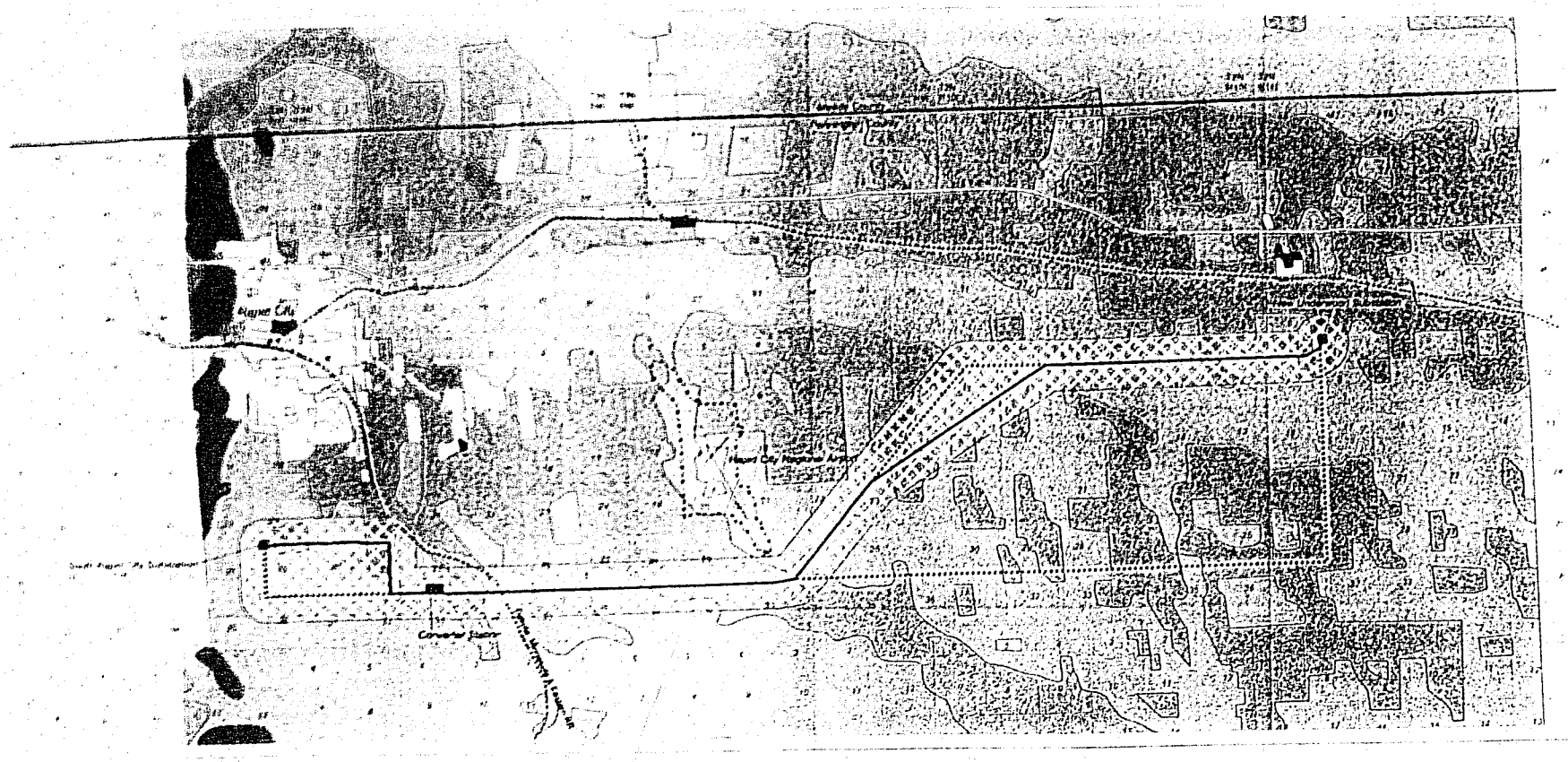
TABLE 4-2

RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PENNINGTON COUNTY AGRICULTURAL STATISTICS 1987 VERSUS 1997

Statistic	1987	1997
Number of Farms	614	637
Land in Farms (acres)	1,142,320	1,043,959
Average Farm Size (acres)	1,860	1,639

Source:

USDA 2001a



Legend

- Commercial and services
- Cropland and pasture
- Forested wetland
- Herbaceous rangeland
- Industrial
- Mixed rangeland
- Nonforested wetland
- Other agricultural land
- Other urban or built-up land
- Recreational
- Residential
- Strip mines, quarries, and gravel pits
- Transitional areas
- Transportation, communications, and utilities
- Mixed urban or built-up land
- Evergreen forest land
- Deciduous forest land
- Study Corridor
- Converter Station
- Existing Substation
- Proposed Alignment of Transmission Line
- Alternative Alignment of Transmission Line
- Airport Property Boundary
- Railroad
- County Boundary
- Section Lines

N

2 0 2 4 Miles

Notes

Land use and land cover data derived from United States Geological Survey 1975-76 Rapid City, SD and 1978 Hot Springs, SD Land use series maps published in 1980

FIGURE 4.1
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LAND USE

Revised October 9, 2001

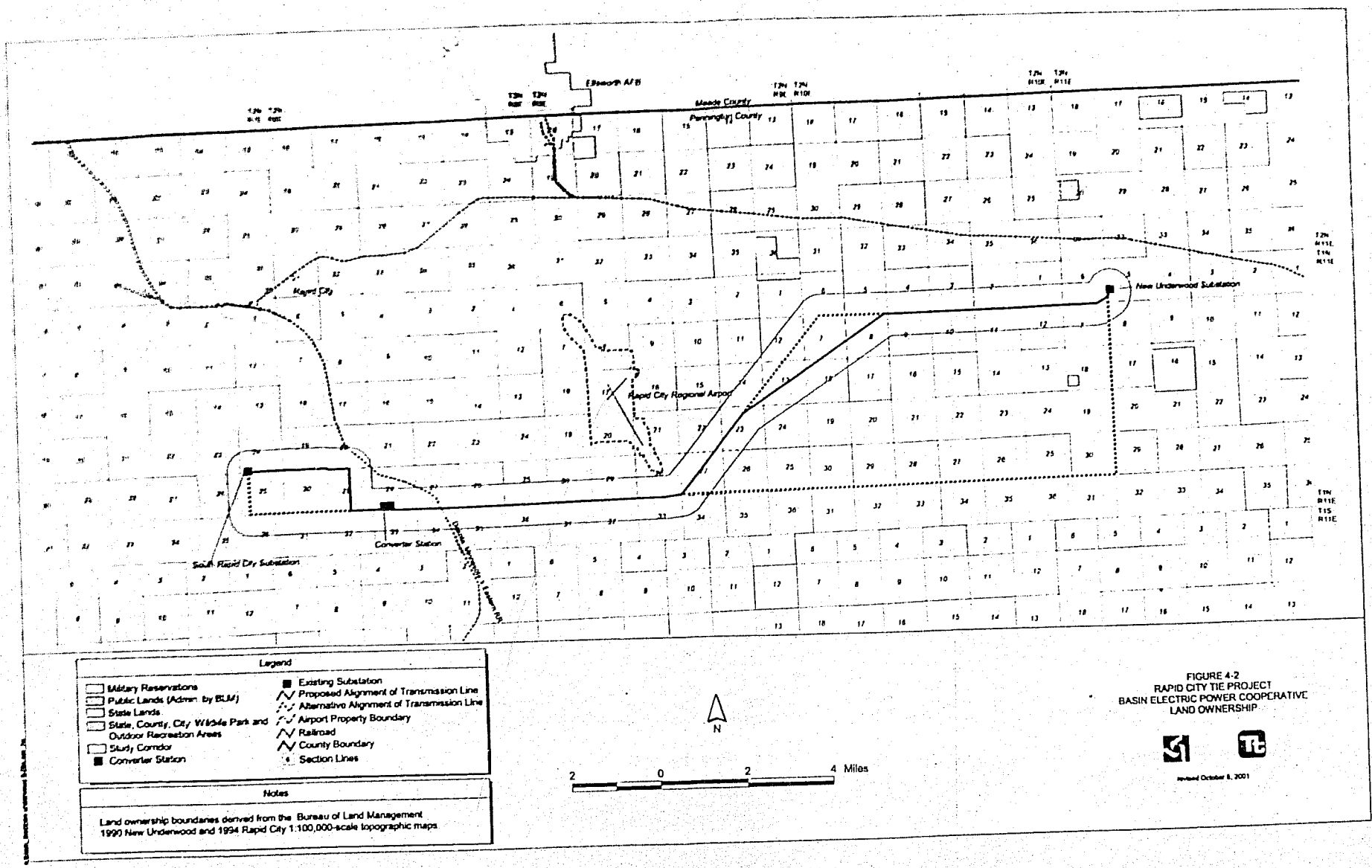


FIGURE 4-2
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LAND OWNERSHIP

Revised October 8, 2001

4.2 FLOODPLAINS

The proposed alignment of the transmission line crosses Dry Creek and Rapid Creek, the two primary bodies of water that are associated with floodplains (Figure 4-3). According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) of Pennington County and maps of the corridor for the proposed project, the project corridor crosses 100-year floodplains associated with Dry Creek at two locations. The westernmost crossing is less than 200 feet wide, and the easternmost crossing of the Dry Creek floodplain system is approximately 800 feet wide. In total, a relatively small area of the 100-year floodplain associated with Dry Creek is located within the 0.5-mile-wide study corridor.

In addition, FIRMs indicate that the study corridor crosses 100-year and 500-year floodplains associated with Rapid Creek. The study corridor crosses 0.8 mile of land classified as a 500-year floodplain on Rapid Creek. In addition, the study corridor crosses the 100-year floodplain of Rapid Creek, spanning 0.7 mile. The crossing of the 100-year floodplain terminates just west of SD 40. The combined 100- and 500-year floodplains associated with Rapid Creek are more than 1 mile wide through most of its basin southeast of Rapid City. The 100-year and 500-year flood zones are associated with the Rapid Creek channel along most or all its length in Pennington County. As a result, it would be nearly impossible and impractical for the project to avoid these floodplains.

Finally, the study corridor passes within 0.5-mile north of a delineated 100-year floodplain associated with an unnamed ephemeral tributary of Rapid Creek. The study corridor crossed this ephemeral tributary; however, the proposed crossing is approximately 0.25 mile upstream of the 100-year floodplain, according to the FIRM map.

4. WETLANDS

Section 404 of the Clean Water Act (CWA; 33 U.S.C 1344) provides a statutory definition of wetlands and assigns jurisdiction over protection of wetlands to the U.S. Army Corps of Engineers (USACE). Section 404 of the CWA defines wetlands as "...those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (WTI 1995).

Wetlands generally include swamps, marshes, bogs, and similar areas (Title 40 CFR 230.3 and 33 CFR 328.3). Figure 4-4 identifies wetlands located in and around the project area.

Wetlands are important regional ecological resources within the project area, providing the following critical functions, among others:

- Filtration of sediments and pollutants that run off from surface water
- Retention of flood water
- Erosion control
- Resting, foraging, and nesting habitat for waterfowl and mammals
- Spawning areas for fish
- Amphibian habitat
- Habitat for hydrophytic vegetation.

An area is considered a jurisdictional wetland only if it exhibits the following three characteristics: evidence of hydric soils; dominance of hydrophytic vegetation; and wetland hydrology. This section describes wetlands, in general, within the vicinity of the study area and, in more detail, inside the study area. The study area for wetlands resources is defined as a corridor the length of the proposed transmission line and 0.5 mile on either side of the centerline of the transmission line.

4.3.1 Regional Wetlands Occurrence

Western South Dakota features a relatively arid climate and few large wetland areas. Wetlands in the project area are predominantly associated with river or creek systems and impoundments. Wetlands often occur in transition zones between open water and upland systems that are inundated or saturated for prolonged periods during the growing season, considered May through September for western South Dakota. Hydrology in wetlands in the study area is generally governed by precipitation, stream flooding, fluctuations in the water table, surface saturation, and seepage associated with distribution of irrigation water.

With the primary exception of wetlands associated with the channels of Rapid Creek, Box Elder Creek, and Dry Creek, the majority of wetlands in the region are emergent and are associated with irrigation diversions and stock ponds. Most of the emergent wetlands in the area are of the palustrine class, are seasonally or temporarily flooded, and are formed by dikes or impoundments. These wetlands are

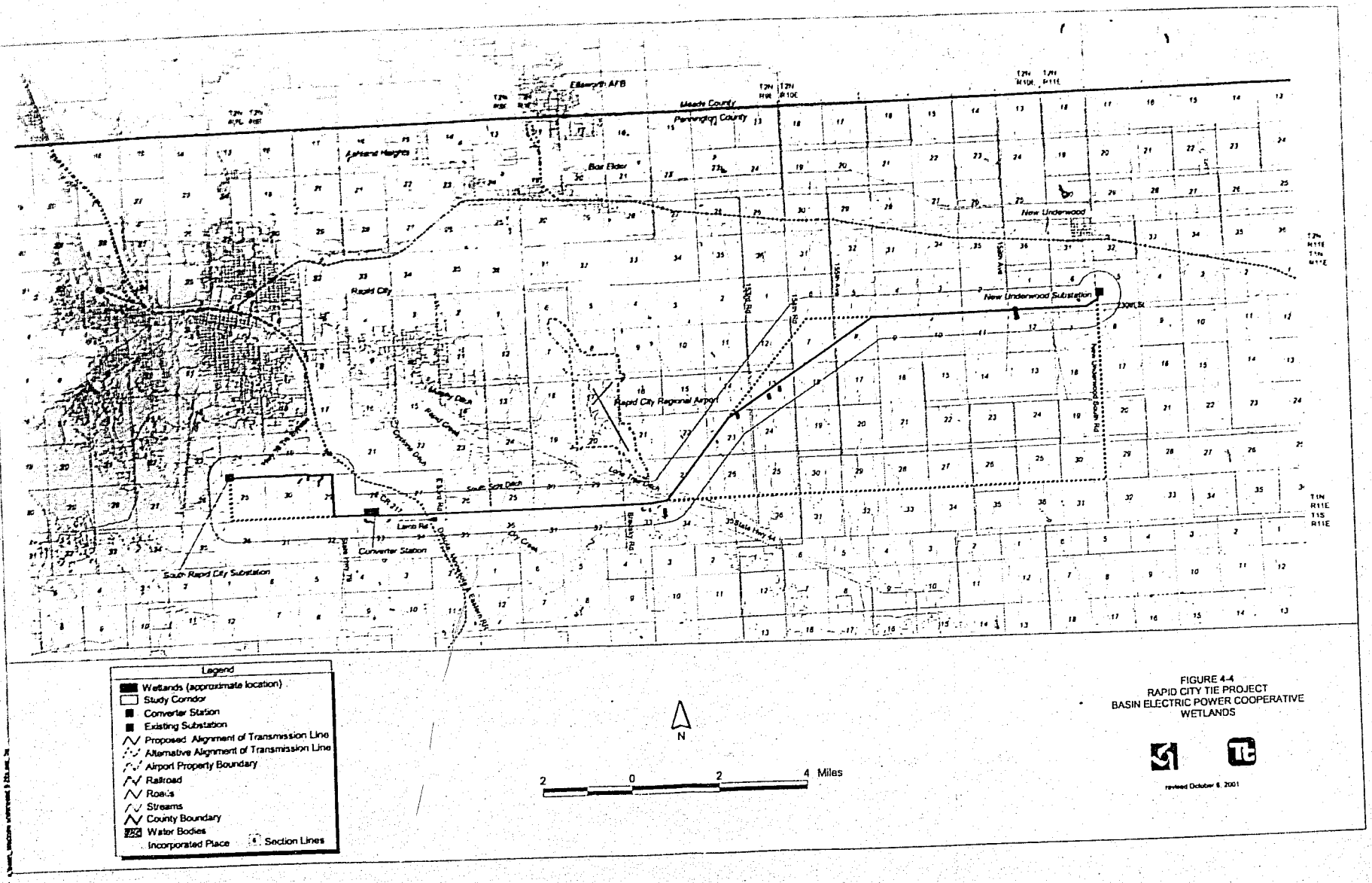


FIGURE 4-4
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
WETLANDS

revised October 6, 2001

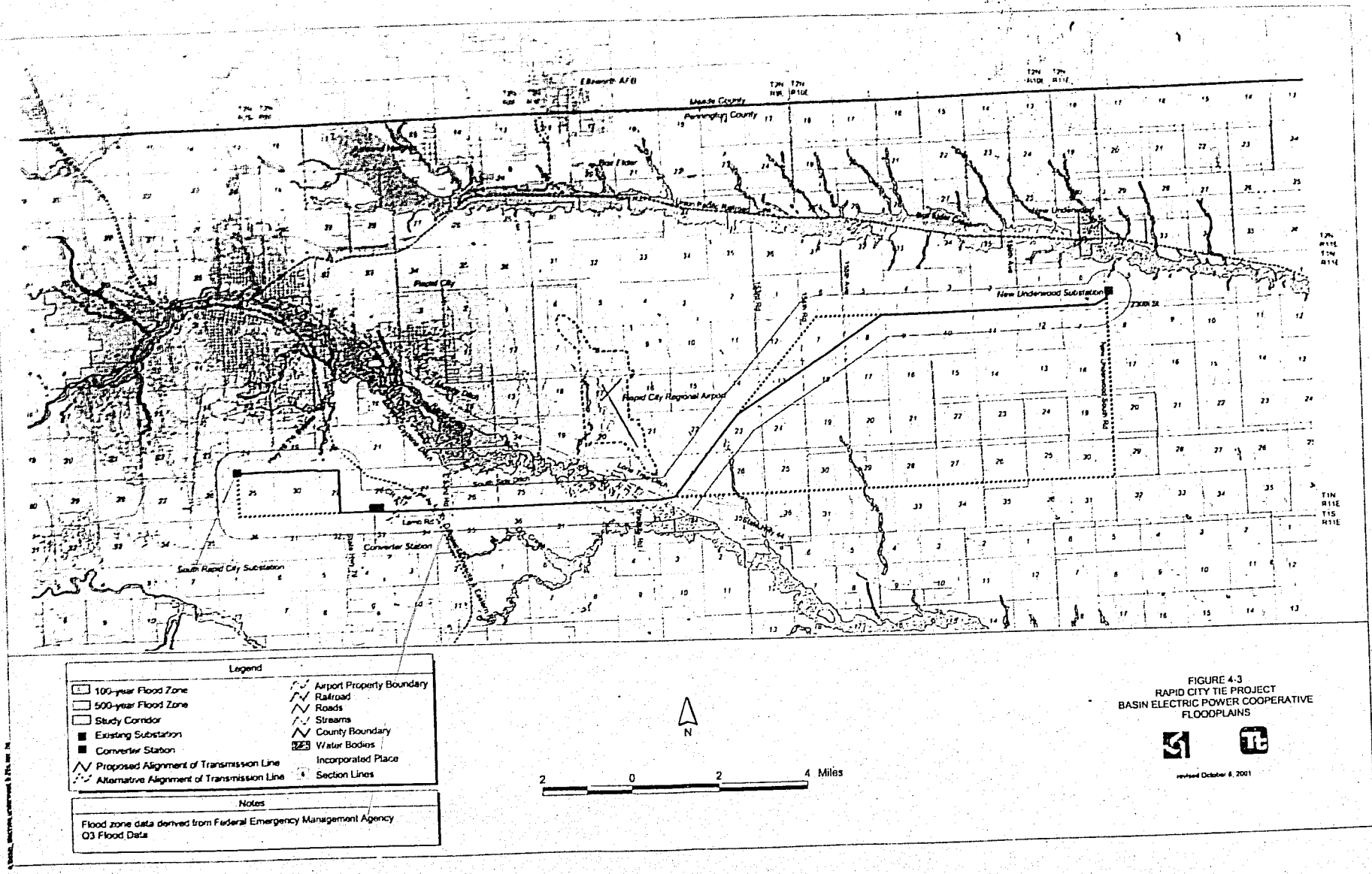


FIGURE 4-3
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
FLOODPLAINS

revised October 8, 2001

predominantly mixed emergent marsh and cattail marsh. The mixed emergent marsh wetlands support a mixture of rushes (*Juncus* spp.), common reed grass (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), inland saltgrass (*Distichlis spicata* var. *stricta*), brome (*Bromus* spp.), prairie cord grass (*Spartina pectinata*), and American sloughgrass (*Beckmannia syzigachne*). Species in the herbal layer of these emergent marshes include smartweed (*Polygonium coccineum*), Indian hemp (*Apocynum cannabinum*), blue vervain (*Verbena hastate*), swamp milkweed (*Asclepia incarnata*), and bulb-bearing water hemlock (*Cicuta bulbifera*). Emergent wetlands in the cattail marsh category are dominated by cattails (*Typha latifolia* and *Typha augustifolia*). Other species in the cattail marsh communities include sedges (*Carex* spp.), swamp milkweed (*Asclepia incarnata*), marsh skullcap (*Scutellaria galericulata*), and jewel weed (*Impatiens capensis*). Cattail marshes generally develop a peaty mat over time that allows roots to grow without contacting the bottom of the mat.

4.3.2 Study Area Wetlands Resources

Some areas that are hydraulically connected with Rapid Creek, Dry Creek, and a few unnamed drainages in the study area support palustrine and riverine wetlands in the forested and scrub-shrub wetlands (although most are emergent). Wetlands along Rapid Creek and larger drainages in the study corridor are often formed on unconsolidated bottoms or shores or are intermittently exposed. Forested wetlands are characterized by woody vegetation more than 6.0 meters tall (Cowardin and others 1979). Only very small, isolated areas of forested wetlands exist in the study area. Dominant trees found in forested wetlands in the project area are cottonwood (*Populus* spp.), Chinese elm (*Ulmus pumila*) and willow (*Salix* spp.). These wetlands tend to be flooded during the spring and during periods of heavy runoff.

According to National Wetland Inventory (NWI) maps, scrub-shrub wetlands are found near the project area in small, isolated locations along Rapid Creek. Scrub-shrub wetlands are characterized by woody vegetation less than 19 feet tall and consist of a mixture of shrubs and small trees. Species commonly found in scrub-shrub wetlands within the study area include willow (*Salix* spp.), alder (*Alnus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), and jewel weed (*Impatiens capensis*).

The corridor for the proposed project (62.5 feet on either side of the proposed center line, for a total width of 125 feet) crosses or contacts 14 areas delineated as wetlands, based on information obtained during field surveys coupled with NWI mapping information. Wetlands identified on NWI maps are typically located based on aerial photography without field checking; several potential wetlands identified on the NWI maps were not found to be jurisdictional wetlands based on a field reconnaissance conducted by wetland scientists from Tetra Tech EM Inc. (Tetra Tech). The area of wetlands within the approximately 125-foot-wide corridor for the proposed project plus the proposed Basin Electric converter station site is approximately 2.0 acres.

The acreage of wetlands within 0.5 mile of the centerline of the proposed project is approximately 20 acres. Of these 20 acres, approximately 18 acres are estimated to be palustrine emergent wetlands associated with impounded water. Most of the remaining 2 acres of wetlands within the project corridor are riverine wetlands along Rapid Creek.

4.4 CULTURAL RESOURCES

This section presents the results of the cultural resources records search and field inspection of the Rapid City Tie Project. The entire report is included in Appendix B. The field work was conducted in April 2001 by Arvilla Consulting.

4.4.1 Previous Investigations

The record search covered a study area of 0.5 mile on either side of the proposed alignment. A total of 16 previous cultural resource inventories were conducted in the project impact area. No cultural resource inventories located sites within the study area.

An examination of the National Register of Historic Places (NRHP) listing did not identify any sites within the study area. Several previously recorded historic properties located in the project ROW, however, are considered eligible for inclusion on the register. These are the Chicago, Milwaukee, and St. Paul Railroad and the Rapid Valley irrigation ditches, discussed in more detail below.

4.4.2 Methods and Results

The inventory was conducted by pedestrian transects. In some areas, a 100-foot wide meandering transect was employed to cover the area. In others, two transects were necessary, and in the narrowest areas only a single 50-foot wide transect was required. The converter station was examined in transects spaced approximately 60 feet apart. Over most of the area's surface, visibility ranged from fair to excellent–from 20 to 90 percent. Even in areas where coverage by vegetation was fairly dense, sufficient ground surface was visible in eroded patches, two-track and cow trails, and rodent burrows. Four shovel tests that measured about 1 foot were dug where the study area crossed the east bank of Rapid Creek.

Four sites were recorded during the inventory, and two previously known sites were intersected by the project ROW. The sites are identified in Table 4-3. Figure 4-5 depicts the site locations.

TABLE 4-3
RAPID CITY TIE PROJECT
BASIN ELECTRIC COOPERATIVE
LIST OF CULTURAL RESOURCES

Site	UTM Centroid (NAD 27 Zone 13)		Site Dimensions		Recommendation
	East	North	East-west	North-south	
39PN1974	653166	4874375	22m	22m	No historic properties affected if cairn is avoided
39PN1975	664650	4880405	22m	22m	No historic properties affected if cairn is avoided
39PN1976	670950	4881280	40	25	No historic properties affected
PN-000-00452	645239	4875885	25	25	No historic properties affected
30PN2007	-	-	Linear	Linear	No historic properties affected
Irrigation Ditches	-	-	Linear	Linear	No historic properties affected

Note:

Site dimensions enlarged by 10m in each direction to allow for Global Positioning System (GPS) variations.

Archaeological Site 39PN1974

This site consists of a single rock cairn located on a high bluff overlooking Rapid Creek. To the south, the terrain slopes gradually down to Dry Creek. A total of 36 stones are visible on the surface, all heavily sodded in. They form a roughly circular mosaic measuring 98 inches east-west by 102 inches north-south. The stones range from about 4 to 12 inches across; most are of metaquartzite or granite. A close examination of the pasture and field surrounding the site area yielded no sign of other features or artifacts. The cairn was mapped, but no excavation was attempted. Its position on the high bluff and the depth to which the stones have been buried in the sod suggest an aboriginal affiliation.

Archaeological Site 39PN1975

This site is situated on the high bluffs overlooking Boxelder Creek to the north. Two small tertiary flakes – one of red (perhaps Spearfish) chert and the other of Tongue River silicified sediment – were found near the edge of the bluff. Visibility was very good over most of the area around the flakes, but no other artifacts could be found. Four shovel tests, each measuring 12 inches, were excavated to a depth of about 14 inches. Each confirmed a deflated surface of gravels underlain by a clayey soil mixed with gravel. No sign of cultural materials was found in the tests.

A rock cairn is located on the edge of the bluff about 130 feet southwest of the flakes. It consists of 10 large cobbles arranged in a pile that measures 31 inches north-south by 24 inches east-west. The stones range from about 4 to 12 inches across and are made of granite and metaquartzite cobbles. All are well sodded. The cairn was mapped but was not excavated. It is not possible to tell if the flakes are contemporaneous with the cairn; its position on the bluff suggests that it is of aboriginal origin.

Archaeological Site 39PN1976

This site is made up of a stone-lined well and a leveled building platform. The platform is situated on a low, west-facing hill just above an old stock dam and an intermittent stream that runs north out of the nearby foothills of the Boxelder Creek escarpment. An area measuring about 40 by 40 feet was leveled in the hillside to accommodate a structure of some sort. No trace of foundations was found, and the only hints of a superstructure consisted of scattered fragments of two-by-four lumber with 16-penny nails. A search of the area revealed no sign of any bottles, cans, or other artifacts that would suggest a habitation of any sort.

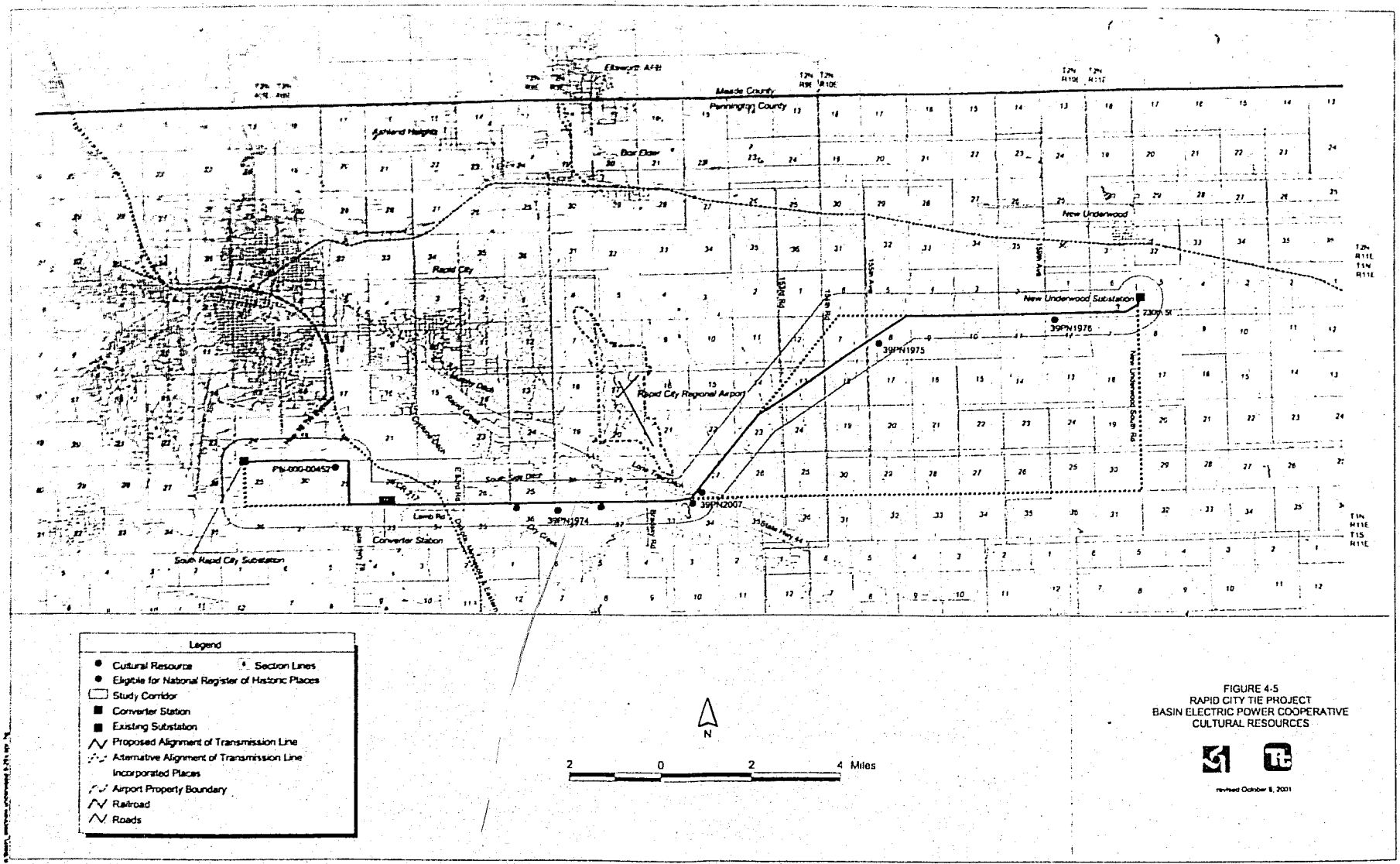


FIGURE 4-5
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
CULTURAL RESOURCES

revised October 8, 2001

A stone-lined well is located about 100 feet west of the platform feature. The stones are local field stones and were laid without mortar. The well measured 6 feet across. It has been filled in, and at some time in the past old fence posts were laid over the top. Adjacent to the well is what appears to the rear fender from a 1914–1915 vintage Model-T Ford (identified from a parts list at http://www.macsautoparts.com). A smashed, rusted, cannibalized car body, resembling a Model-T, is located about 300 feet south of the well and platform.

William D. Cosner homesteaded the property in 1916. Cosner lost it to foreclosure in 1943, and I.T. Pharis purchased it that same year. Glen Crosbie bought it in 1946, and in 1980 it passed to Gene F. Crosbie, the current owner.

The site does not appear to have been an occupation of any sort. There is no sign of debris from a habitation or other structures. The age of the car and lumber suggest a date sometime after about 1916, which is consistent with the period of ownership by Cosner. It likely consisted of some sort of shed for cattle and a well for watering.

Historic Site PN-000-00452

This site consists of a small concrete bridge on an abandoned road grade. The project construction zone intersects it. The bridge is of the concrete slab variety, spanning a small intermittent stream. There is no maker's identification on the bridge, and the railings have been broken off at some time in the past. The U.S. Geological Survey (USGS) 7.5-minute Rapid City East quadrangle map (USGS 1953d, photorevised 1978) shows an old road grade at this location, but no other information is available. It may have been an earlier incarnation of SD 79, which currently parallels it about 1,000 feet to the west. No trace of any road exists on the grade today to indicate whether it had ever been paved.

Archaeological Site 39PN2007

The project construction zone overlaps the bed of the Chicago, Milwaukee, and St. Paul Railroad southeast of Rapid City. The railroad has been assigned number 39PN2007 in Pennington County and is considered eligible for inclusion on the NRHP. At present, the site consists of a single grade. Tracks and ties are present, although they have been covered over by a trail that crosses them. No other features associated with the railroad are present. The USGS 7.5-minute Box Elder quadrangle map (USGS 1953a, photorevised 1971) shows the HO Siding at the area, with the adjacent route of SD 44 bending around it.

No trace of it exists today, and SD 44 runs directly parallel to the railroad. Presumably, sometime after 1971, the siding was removed by reconstruction of the highway.

This segment of the railroad was built in 1907 and was abandoned in 1980. It lacks any features or associated structures and could be considered a noncontributing segment of the overall site.

Rapid Valley Irrigation Ditches

The project crosses three of the historical irrigation ditches in Rapid Creek valley: the Cyclone, South Side, and Lone Tree ditches. The Cyclone Ditch was built about 1890 by the Cyclone Ditch Co. The ditch is considered eligible for inclusion on the NRHP. It consists only of earthwork where the project intersects it; no structures or associated features are present.

The South Side Ditch, also known as the Lower Rapid Ditch, was constructed in 1878. In 1904, the western portion of the ditch was abandoned and a new one was constructed parallel to and south of it. No structures or features are present where the project ROW intersects the ditch.

The Lone Tree Ditch runs north of Rapid Creek. It was constructed in 1880 and 1881. Two ditches are present and run parallel to each other. The project crosses both ditches. No features or structures are present within the project ROW.

4.5 THREATENED AND ENDANGERED SPECIES

This section presents a general description of T&E species found throughout South Dakota and the results of inventories in the study corridor of T&E species and habitat conducted by the South Dakota Department of Game, Fish, and Parks (SDDGFP), South Dakota Natural Heritage (SDNH), and Basin Electric.

The USFWS, SDDGFP, and the SDNH Database (SDNHD) were consulted to identify any T&E species that could inhabit Pennington County. The resources available indicate that the habitat within the study corridor is suitable for many federally and state listed species, but only limited surveys have been conducted to verify their presence. Appendix C presents a list of threatened, endangered, and candidate species in South Dakota. Figures 4-6A and 4-6B show habitats of threatened, endangered, and candidate species found during the field survey in April 2001.

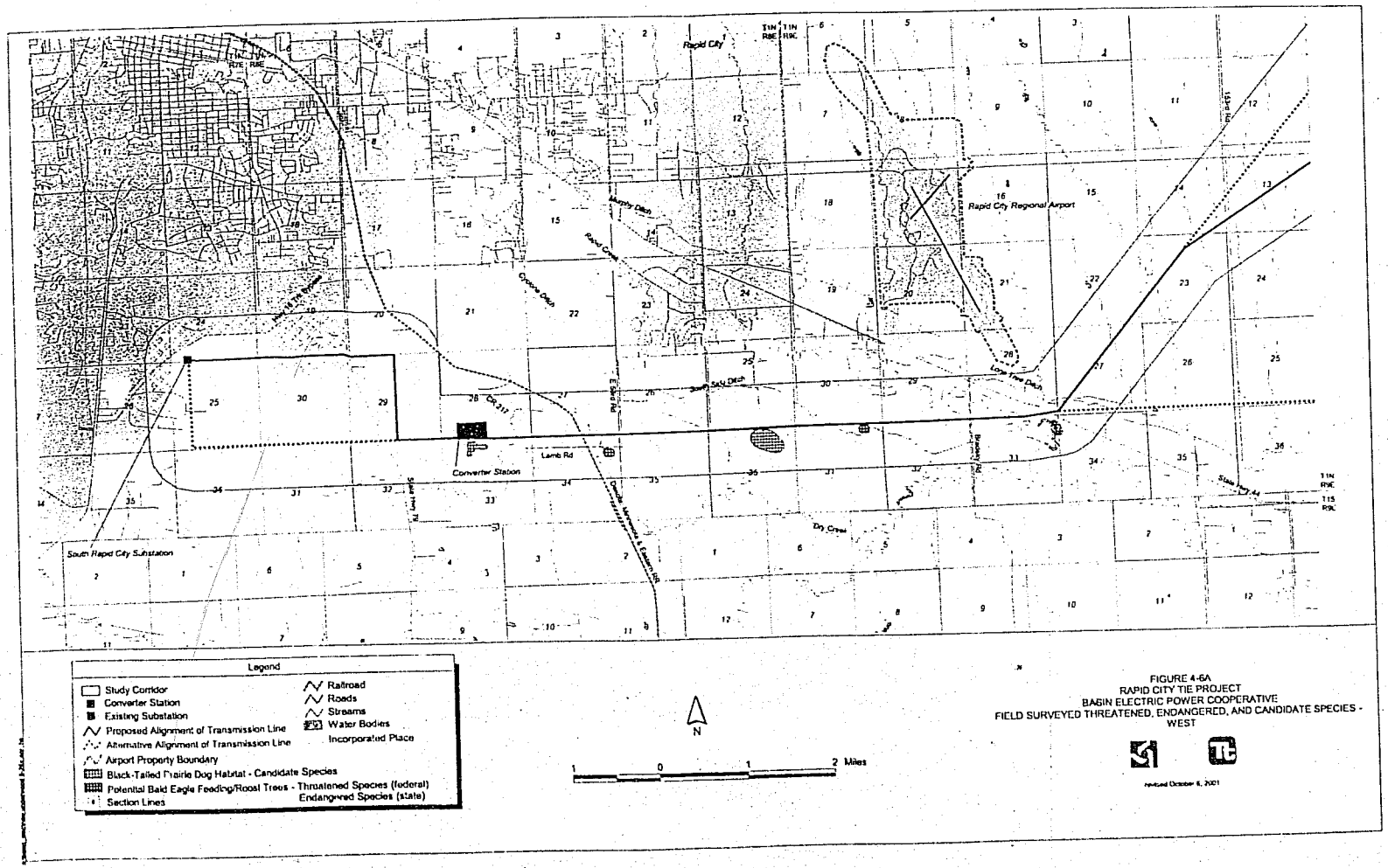


FIGURE 4-6A
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
FIELD SURVEYED THREATENED, ENDANGERED, AND CANDIDATE SPECIES - WEST

Revised October 6, 2021

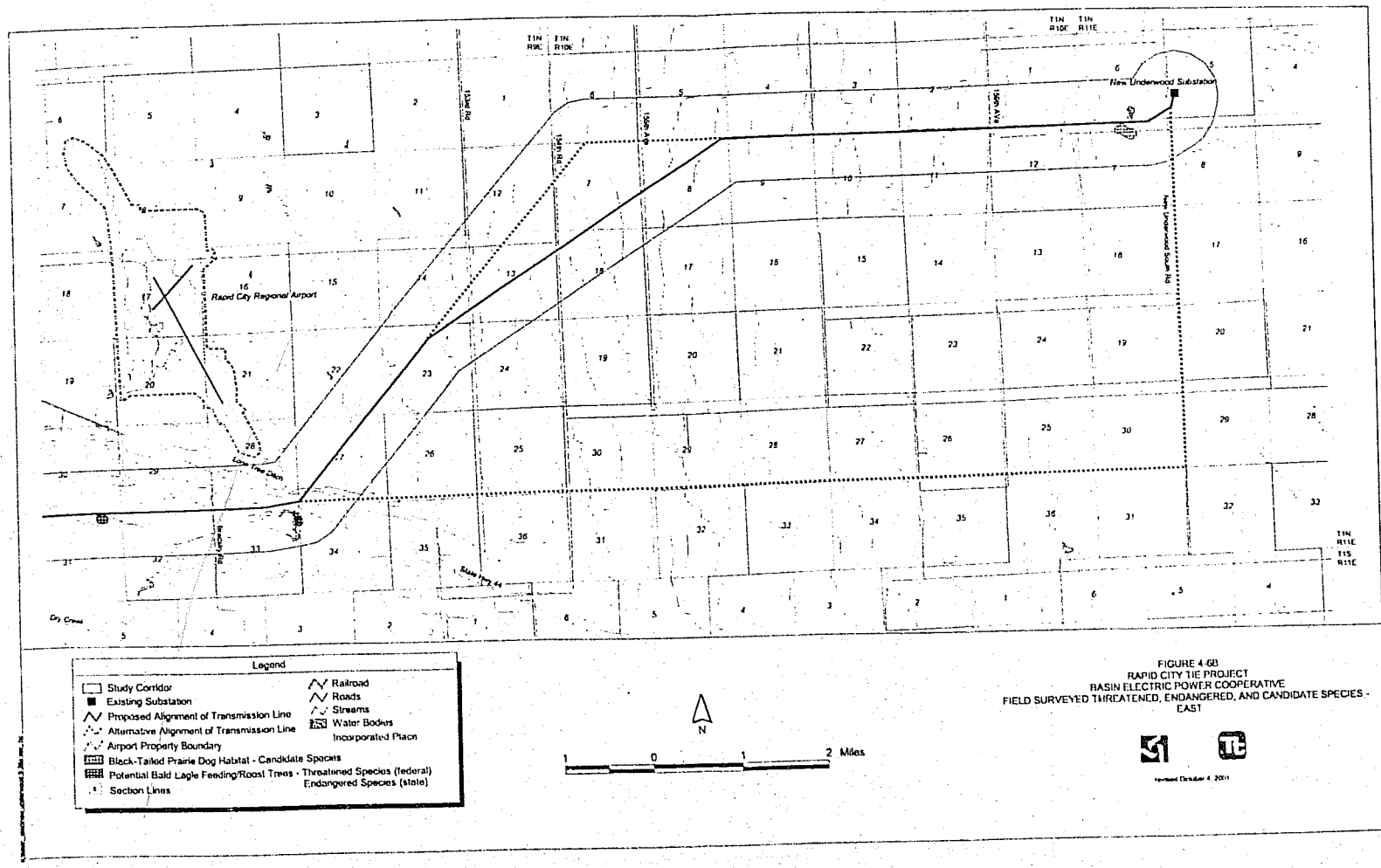


FIGURE 4-60
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
FIELD SURVEYED THREATENED, ENDANGERED, AND CANDIDATE SPECIES - EAST

4.5.1 Federal Threatened and Endangered Species and Habitat in the Study Corridor

USFWS has identified nine federally listed T&E wildlife and plant species that could inhabit the study area (USFWS 2001). These species include: the black-footed ferret (*Mustela nigripes*, endangered), piping plover (*Charadrius melodus circumcintus*, endangered), whooping crane (*Grus americana*, endangered), interior least tern (*Sterna antillarum athalassos*, endangered), Topeka shiner (*Notropis topeka*, endangered), pallid sturgeon (*Scaphir hynchus albus*, endangered), American burying beetle (*Nicrophorus americanus*, endangered), Ute ladies'-tresses orchid (*Spriranthes diluvialis*, threatened), and bald eagle (*Haliaeetus leucocephalus*, threatened).

Two other species in the area are candidates for listing as either threatened or endangered. They include: the swift fox (*Vulpes velox*) and sturgeon chub (*Macrhybopsis gelida*). USFWS has also been petitioned to list the black-tailed prairie dog (*Cynomys ludovicianus*) under the Endangered Species Act.

Nine of the 12 federally listed species (including candidates for listing) occur as terrestrial flora or fauna. One plant, one insect, four bird, and three animal species make up the terrestrial T&E that could occur in the project area. Three of the 12 federally listed species (including candidates for listing) occur as aquatic fauna species. These 12 species are listed below.

- **Black-footed Ferret** - Black-footed ferrets are members of the weasel family that live in arid prairies among prairie dog colonies. Prairie dogs compose approximately 90 percent of the diet of the black-footed ferrets. The black-footed ferrets also use the prairie dog burrows for dens. Black-footed ferrets are nocturnal and spend much of their time underground. Therefore, confirming their presence is difficult. According to available information compiled by USFWS and SDNHD (SDNHD 1998), five sightings or physical evidence were confirmed in Pennington County. Reintroduction of the black-footed ferret has begun in several locations of the Conata Basin/Badlands and Badlands National Park (USFWS 1998).

- **Piping Plover** - Piping plovers are one of six belted plovers found in North America that occur in the project area during the breeding season. No evidence of the species was found on a 20-mile survey of the Cheyenne River in Custer and Pennington counties in 1994 (SDDGFP 2001a, b).

- **Whooping Crane** - Found only in North America, the whooping crane population currently totals 260 and exists in three wild populations and four captive locations. The migration route of the whooping crane passes through western South Dakota in the Missouri River basin. Between 1957 and 1990, five sightings of whooping cranes were confirmed in Pennington County (USFWS 2001).

- **Interior Least Tern** - Successful nesting of the interior least tern has been documented on the Missouri and Cheyenne Rivers in South Dakota (Dirks and others 1993). No

interior least terns were sighted during surveys conducted along 28 miles of the Cheyenne River between Spring Creek and Wasta, South Dakota, in June 1999. Two sightings of the interior least tern were reported in 1957 around the Missouri River in the vicinity of Pierre (Hughes County) and Fort Pierre (Stanley County) in the proposed project area (*SDNHD 1998*).

- **American Burying Beetle** - The American burying beetle is the largest North American member of the genus Nicrophorus, in the Silphidae family. The American burying beetle can fly long distances; therefore, any habitat in South Dakota with significant humus or topsoil suitable for burying carrion, its primary food source, is considered potential habitat for the American burying beetle.

- **Ute Ladies' Tresses Orchid** - Ute ladies' tresses orchid is a perennial, terrestrial plant that occurs in the moist soils of wet meadows near springs, lakes, or perennial streams. No orchids were found during the site reconnaissance. However, several areas within the corridor for the proposed power line may serve as suitable habitat for this species.

- **Bald Eagle** - Bald eagles have been documented wintering throughout the project area, and observations indicate that the Cheyenne River corridor in South Dakota is important to their wintering (SDDGFP 2001a, b). Communal nocturnal roosts, diurnal perch sites, and feeding areas are all key components of winter habitat that exist in the study area (Figures 4-6A and 4-6B).

- **Swift Fox** - The population of the swift fox has declined from trapping and poisoning aimed at coyotes and wolves. Other factors that have been responsible for the decline of the population include habitat fragmentation and destruction, interspecies competition between coyotes and other species of fox, reduction in prey as a result of rodent control measures, hunting, and predation (primarily from coyotes). Observations indicate that the species may occur throughout the project area.

- **Black-tailed Prairie Dog** – Because of the destruction of habitat, the population of the black-tailed prairie dog has declined by almost 98 percent. The habitat has continued to decline as a result of increased urban development, fragmentation caused by agriculture, eradication by ranchers, state and federally supported animal control programs, recreational shooting, and wildlife disease. The prairie dog's survival is essential for the success and survival of the federally endangered black-footed ferret. The black-tailed prairie dog occurs at several locations in the study area (Figures 4-6A and 4-6B).

- **Topeka Shiner** – Habitat for the Topeka shiner does not occur within the study corridor.

- **Pallid Sturgeon** - Pallid sturgeons inhabit swift sections of large rivers. It is native to the Missouri and Mississippi rivers and currently remains in the impounded portion of the Missouri River known as Lake Sharpe. Neither the Missouri River nor similar habitat exists in the study corridor.

- **Sturgeon Chub** - Sturgeon chubs are members of the minnow family that inhabit warm, turbid, medium to large rivers with areas of strong current that contain shallow sand or gravel bottom zones (DM&E 2000). Sturgeon chub habitats do not exist in the study corridor.

4.5.2 U.S. Fish and Wildlife Service Inventory Results

USFWS was contacted to confirm whether any of the species listed above had been inventoried in the study area. A response from USFWS was received on March 5, 2001 stating that the USFWS had no objection to the proposed project. A copy of the response is located in Appendix D.

4.5.3 South Dakota Natural Heritage Program Inventory Results

SDNH records were searched for state rare or T&E species that occur within the study corridor (Backlund 2001). There were no records of any rare, threatened, or endangered species along the proposed corridor route or in the vicinity of the proposed substation. However, SDDGFP has not surveyed much of the study area for existing biological resources.

4.5.4 Recent Study Corridor Site Surveys

Reconnaissance field surveys were completed in the study corridor on two separate occasions: February 7, 2001, by Dennis Haag (Tetra Tech), Scott Lang (Basin Electric), and Robert Hammer (Tetra Tech); and April 4 through 6, 2001 by Dennis Haag, Alan Johns (Tetra Tech), Pam Cornelisse (Tetra Tech), and Scott Lang. Surveys consisted of walking or driving the proposed route of the power line and looking for individuals or evidence such as tracks, stems, or habitat characteristics that would indicate that the listed species may occur in the corridor for the proposed power line. The bald eagle was observed perched in cottonwood trees on February 7, 2001, during a field survey conducted by Tetra Tech. Black-tailed prairie dogs were observed in the project corridor during the field survey conducted between April 4 through 6, 2001. Figures 4-6A and 4-6B indicate the approximate location of these sightings. Surveys during the summer and fall seasons would be more suitable for sightings or evidence of habitat for other listed species. However, many of the listed species are very rare opportunities for sighting are restricted. Therefore, it is unlikely that additional surveys would be successful in verifying whether other listed species occur within the corridor for the proposed power line.

4.6 FISH AND WILDLIFE RESOURCES

This section describes fish and wildlife resources in the general vicinity of the study area. The area in and around the study corridor is dominated by rangeland, pasture, and cropland habitats. Wildlife in these habitats is made up of species adapted to urban, grassland, and riparian areas. Domesticated animals

raised in the region include cattle, sheep, and hogs. Appendix E presents a comprehensive list of local fish, birds, reptiles, and other animals.

Big game wildlife observed during the site reconnaissance include mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and pronghorn antelope (*Antilocapra americana*).

Inhabitants or evidence of inhabitants in the grasslands and rangelands observed in study area include: cottontail rabbit (*Sylvilagus floridanus*), blacktail jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), common skunk (*Mephitis mephitis)*, black-tailed prairie dog (*Cynomys ludovicianus*), and plains pocket gopher (*Geomys bursarius)*. Smaller mammals that inhabit the project area include deer mouse (*Permomyscus manicluatus*), plains pocket mouse (*Perognathus flavescens*), Franklins's ground squirrel (*Spermophilus franklinii*), and thirteen-rail lined ground squirrel (*Citellus tridecemrail lineatus*) (Tetra Tech 2001c).

Game birds observed in the study area include sharp-tailed grouse (*Tympanuchus phasianellus*) and mourning dove (*Zenaida macroura*).

Various waterfowl use seasonal and permanent streams and wetlands in the study area for breeding, and may use the grasslands, pastures, and agricultural fields for forage during migration. Waterfowl that permanently or temporarily inhabit the area observed during the site reconnaissance include mallard ducks (*Anas platyrhynchus*), Ross goose (*Chen vossii*), and Canada geese (*Branta canadensis*) (Tetra Tech 2001c).

Western meadowlark is the most common species of songbird in the state and region. Other grassland birds commonly observed in the study area include killdeer (*Charadrius vociferous*), common nighthaw (*Chordeiles minor*), dickcissel (*Spiza americana*), Vesper sparrow (*Pooecetes gramineus*). lark sparrow (*Chondestes grammacus*), and grasshopper sparrow (*Ammodramus savannarum*).

Where trees occur in streambeds or planted shelterbelts, Marsh hawk (*Circus cyaneos*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and golden eagle (*Aquila chrysaetos*) were observed in study area. Bald eagles (*Haliaeetus leucocephalus*) often winter near Rapid Creek; however bald eagle nests were not observed during the site reconnaissance. Bald eagles are described in greater detail in Section 4.5.

Open grassland areas near wetlands provide habitat for reptiles, including the common garter snake (*Thamnophis sirtalis*) and plains garter snake (*Thamnophis radix haydeni*) found throughout South Dakota. The prairie rattlesnake (*Crotalus viridis viridis*) is found in open prairies and croplands. Bullsnake (*Pituophis melanoleucus sayi*) and racer (*Coluber constrictor flaviventris*) are found in open grasslands in upland areas. Amphibians typical of the wetland areas include the eastern tiger salamander (*Ambystoma tigrinium*), western chorus frog (*Pseudacris triseriata*), boreal chorus frog (*Pseudacris triseriata maculata*), and northern leopard frog (*Rana pipiens*). Blotched tiger salamander was observed during site reconnaissance.

Common fish species that inhabit Rapid Creek and Dry Creek include creek chub (*Semotilus atromaculatus*), brown trout (*Salmo trutta*), channel catfish (*Ictalurus punctatus*), sauger (*Stizostedion canadense*), and shipjack herring (*Alosa chrysochloris*) (Tetra Tech 2001b).

4.7 VEGETATION

This section describes vegetation and vegetation likely to be present within the study area. The vegetation study area is delineated as a corridor the length of the proposed transmission line and 0.5 mile on either side of the centerline of the transmission line. Ranching is the principal land use in the project area and region, with approximately 60 percent of the acreage in rangeland; about 20 percent is used for cultivated crops or tame pasture and hay. The remaining is cropland converted to grassland under CRP. Appendix D presents a comprehensive list of local common grasses, forbs, shrubs, trees, and wetland flora.

The principal vegetation in the study area represents mixed-grass prairie habitat. Mixed-grass prairie areas in the region are typically dominated by western wheatgrass (*Pascopyrum smithii*), crested wheatgrass (*Agropyron cristatum*), sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), hairy grama (*Bouteloua hirsuta*), needlegrasses (*Stipa* spp.), buffalograss (*Buchloe dactyloides*), needleleaf sedge (*Carex duriuscula*), threadleaf sedge (*Carex filifolia*), big bluestem (*Andropogon gerardii*) or little bluestem (*Andropogon schizachyrium*).

Common forbs and shrubs of the study area include pricklypear (*Opuntia* spp.), sageworts (*Artemisia* spp.), curlycup gumweed (*Grindella squarrosa*), desert biscuitroot (*Lomatium foeniculaceum*), broom snakeweed (*Gutierrezia sarothrae*), skunkbush sumac (*Rhus trilobata*), purple coneflower (*Echinacea angustifolia*), prairie coneflower (*Ratibida columnifera*), Missouri goldenrod (*Solidago missouriensis*), yarrow (*Achillea millefolium*), mullein (*Verbascum thapsus*), wild rose (*Rosa* spp.), yucca (*Yucca*

glauca), pussytoes (*Antennaria* spp.), goatsbeard (*Tragopogon dubius*), American deer vetch (*lotus purshianus*), and dotted gayfeather (*Liatris puncata*).

Trees occur sporadically throughout the rangeland community in small hardwood stands along drainages, around homesteads, and in windrows in agricultural areas. The principal tree species in the study area include narrow leaf cottonwood (*Populus angustifolia*), plains cottonwood (*Populus deltoides*), Russian olive (*Elaeagnus angustifolia*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), Chinese elm (*Ulmus parvifolia*), yellowstem white willows (*Salix alba* var. *vitellina*), western snowberry (*Symphoricarpos occidentalis*), silver buffaloberry (*Shepherdia argentea*), pines (*Pinus* spp.), rocky mountain juniper (*Juniperus scopulorum*), eastern red cedar (*Juniperus virginiana*), and chokecherry (*Prunus virginiana*) (Johnson and Larson 1999a, b).

Common flora found in riparian and emergent wetlands and floodplains in the study area include sedges (*Carex* spp.), American sloughgrass (*Beckmannia syzigachne*), inland saltgrass (*Distichlis spicata* var. *stricta*), marsh smartweed (*Polygonium coccineum*), prairie cordgrass (*Spartina pectinata*), reed canarygrass (*Pharlaris arundinacea*), switchgrass (*Panicum virgatum*), maximilian sunflower (*Helianthus maximiliani*), and sandbar willow (*Salix exigua*) (Johnson and Larson 1999b). Section 4.3 discusses specific wetland areas.

4.8 GEOLOGY, TOPOGRAPHY, AND SOILS

The following sections describe geology, topography, and soils in the study area in Pennington County. The soil resources study areas are the study corridor shown in Figure 4-7.

4.8.1 Geology

The Rapid City Tie Project is located on the eastern flank of the geologic feature known as the Black Hills Uplift. The Black Hills Uplift exposes older erosion resistant rocks in its center and younger, weaker rocks along the periphery. The project area is located in this peripheral zone. The Black Hills region, including the study area, is underlain by Precambrian age metamorphic (rocks altered by heat or pressure) schist, slate, and quartzite. Eastern Pennington County is characterized by sedimentary rocks of limestone, shale, and sandstone of Paleozoic and Mesozoic age. Geologic formations exposed in the study area are mostly sediments of Cretaceous age (SDGS 1998).

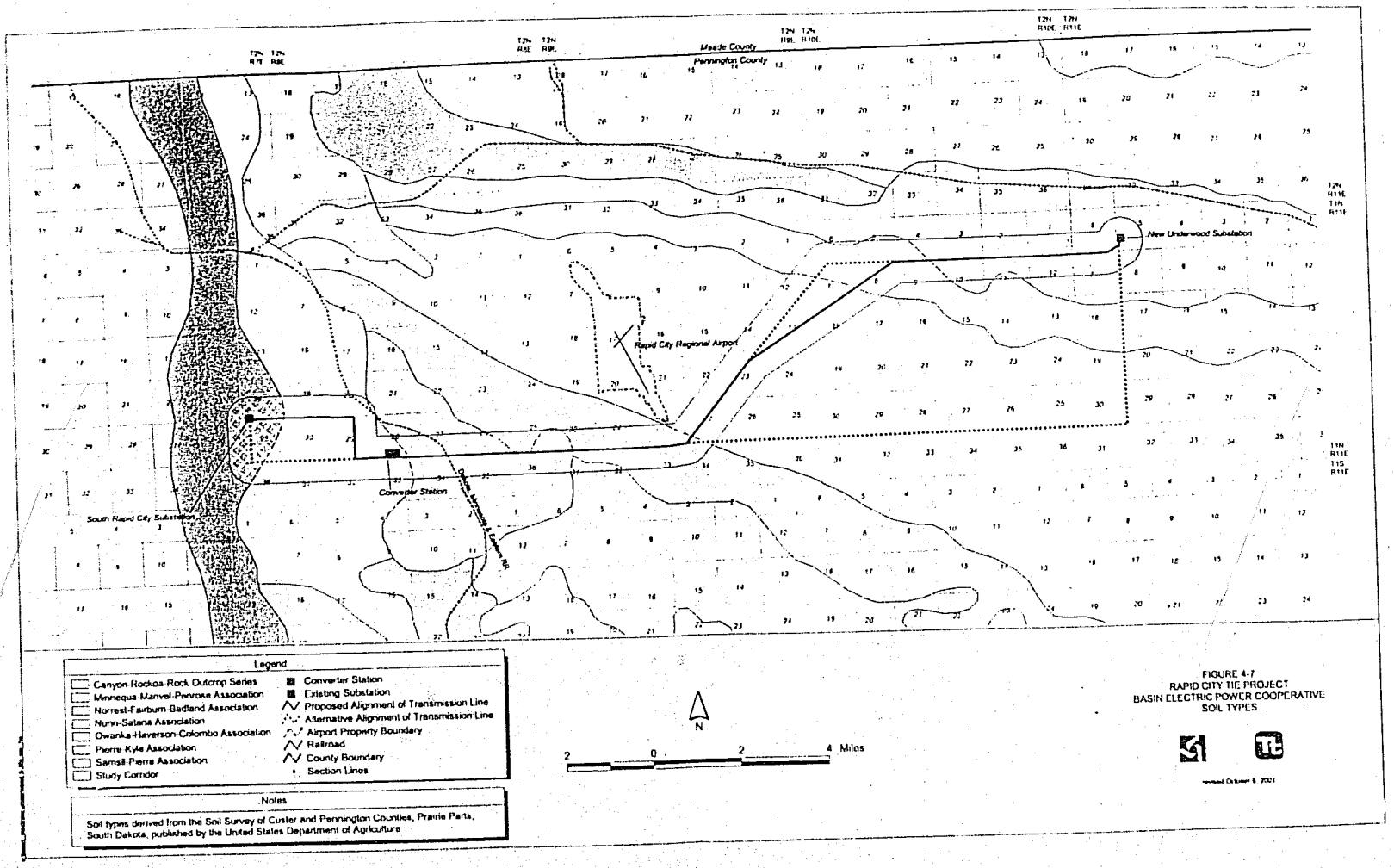


FIGURE 4-7
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
SOIL TYPES

The structural geology of the study area is not complex. The sedimentary formations dip gradually away from the Black Hills Uplift at approximately three to five degrees (Cattermole 1972). Some small amplitude folds occur in the area. No faults have been mapped in the study area.

Engineering geologic problems in the study area are primarily landsliding, mudflows, and expansive soils. The landslide deposits mostly occur on the steep, north-facing slopes of the interstream divides and in areas disturbed by excavation. The landslides are primarily of the block glide or slump type. Mudflows, although not restricted to areas of landsliding, are common along the lower margins of slump landslides (McGregor and Cattermole 1973).

Seismic hazards in the study area are rated as very low. USGS defines seismic hazard by the level of horizontal shaking that has a 1 in 10 chance of being exceeded in a 50-year period. Shaking is expressed as a percentage of the acceleration of gravity (g). For example, a shaking level of 0 to 2 percent indicates a 10 percent chance that a shaking force that exceeds 0 to 2 percent of the force of gravity would be exceeded in a 50-year period. Gravitational forces of 2 to 4 percent could be felt by some people, but would not likely cause any structural damage (USGS 1996). Based on the 1996 USGS Shaking Hazard Maps, all of Pennington County, excluding the extreme southwestern corner, shows a 1 in 10 chance that a force of 0 to 2 percent of g would be experienced in a 50-year period (USGS 1996).

4.8.2 Topography

Topography in the region is dominated by the Black Hills Uplift, a large, dome-like feature located in western South Dakota, including western Pennington County. Regional topography is generally characterized by rolling hills and plains dissected by streams. The western half of the study area is hilly, with elevations ranging from 3,200 feet above msl near Dry Creek to more than 3,700 feet above msl in the westernmost portion of the proposed corridor. However, the floodplain of Rapid Creek is wide and flat (see Figure 4-3). Rapid Creek drains into the Cheyenne River several miles southeast of the project area.

East of Rapid Creek, the corridor for the proposed project extends diagonally to the northeast. Much of the area along this portion of the alignment is relatively flat, cultivated cropland or rangeland that becomes hillier to the north. Elevations increase from approximately 2,900 feet above msl at Rapid Creek to approximately 3,500 feet above msl near the northeastern terminus of the diagonal. This area is characterized by numerous steep ephemeral drainages that transport storm water from areas north of the corridor for the proposed project toward Rapid Creek.

The study corridor turns directly east along a section line at the northeastern terminus of the diagonal. The last portion of the diagonal and the beginning of the east-trending portion of the corridor for the proposed project descends a steep slope into the Boxelder Creek drainage basin. The area features numerous steep ephemeral drainages that transport storm water from the study area in a northerly direction toward Boxelder Creek and numerous diked surface water impoundments for watering stock.

4.8.3 Soils

Soils in the study corridor generally fall into one of six mapped groups. Soils in this region are formed primarily from the in place weathering of sedimentary rocks. Organic matter is slow to accumulate, and fertility is low. Soils in this region are classified as entisols, alfisols, mollisols, and aridisols. Soil associations are shown on Figure 4-7.

Soils west of the study corridor are of the Canyon-Rockoa-Rock Outcrop Series. Soils in the Canyon-Rockoa-Rock Outcrop Series dominate the easternmost terminus of the Black Hills and are composed of rock outcroppings and loamy soils formed from weathered interbedded limestone, sandstone, and shale (USGS 1986a).

Other soil units in the study corridor west of Rapid Creek include the Nunn-Satana Association, the Samsil-Pierre Association, and the Minnequa-Manvel-Penrose Association. Soils in the Nunn-Satanta Association are deep (up to 60 inches), well-drained, loamy soils located on high terraces with slopes ranging from 0 to 9 percent. Satana soils are found on slopes ranging from 0 to 12 percent. Nunn-Satana soils tend to be subject to erosion by wind and water (USDA 1986b).

Samsil-Pierre soils are shallow and moderately deep, well-drained soils with heavy clay content, and occur on dissected plains on slopes that tend to be moderate to very steep. Samsil-Pierre soils are found on ridges and breaks along Rapid Creek. Drainage patterns are well defined and gullies are common. Samsil soils are found on shoulder slopes and upper back slopes. Soft shale bedrock is typically encountered at about 17 inches below ground surface. Gray shale bedrock is typically encountered at 31 inches below ground surface (USDA 1986b).

Soils in the Minnequa-Manvel-Penrose Association are deep to shallow, well-drained, nearly level to very steep, silty and loamy soils on dissected plains and other plains. Drainage patterns are well defined. Most of the soils in this association support native grasses and are used as rangeland. Potential for erosion is high. Manvel soils are deep and silty and occur on slopes with grades ranging from 0 to 15

percent. Penrose soils are calcareous, shallow, and loamy, and are found primarily on shoulder slopes and upper back slopes (USDA 1986b).

Soils in the eastern portion of the study area, in the vicinity of Boxelder Creek, are predominantly of the Samsil-Pierre and Pierre-Kyle Associations. Samsil-Pierre Association soils are described above. Soils in the Pierre-Kyle Association are moderately deep and deep, well-drained, nearly level to strongly sloping, clayey soils on dissected plains, other plains, and alluvial fans. Potential for erosion is high. Pierre soils are moderately deep and are found on back slopes. Kyle soils are found on slopes and tend to be deeper than Pierre soils (USDA 1986b).

4.9 COASTAL AREAS

A discussion of coastal areas is not applicable to this project because the area is located well beyond any coastal areas.

4.10 AIR QUALITY AND CLIMATOLOGY

This section describes air quality resources in the affected environment. The study area for air quality is delineated as Pennington County.

4.10.1 Air Quality

The proposed power line or alternatives would be built in Pennington County, which the U.S. Environmental Protection Agency (EPA) classifies as an attainment area for all regulated pollutants. Classification as an attainment area indicates that all National Ambient Air Quality Standards (NAAQS) have been met. Table 4-4 lists the applicable NAAQS that must be maintained throughout construction of the power line.

No monitored concentrations are available for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), or lead near the proposed project and alternatives because there are no monitoring stations nearby for these criteria pollutants. Data for particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}) are available from a monitoring station at the National Guard Camp Armory and the City Library in Rapid City. Concentrations of PM_{10} have been monitored at these sites since 1995. Several other monitoring stations exist in Rapid City, but the armory and library stations provided the most complete data. Table 4-5 shows the PM_{10} data from the stations for the last 6 years.

The monitoring station at City Library is located in the heart of Rapid City, while the National Guard Camp Armory is located in the western part of the city. No monitoring stations east or south of Rapid City report monitoring data for PM_{10}. Therefore, data from these stations represent concentrations in the study area for air resources.

4.10.2 Climatology

The semi-arid climate for the study area is characterized by cold, dry winters and moderately hot, moist summers. Annually, temperatures range from minus 29°F to 107°F. Table 4-6 presents the average monthly and annual temperatures for Rapid City, which is representative of the study area. The meteorological station in Rapid City has been collecting data over a 52-year period between 1949 and 2001. The average annual temperature in Rapid City over these 52 years is 47.8°F. The highest mean monthly temperature occurs in July and is 72.3°F, while the lowest occurs in January and is 24.1°F. The study area is subject to these large annual variations in temperature because it is in the center of the North American land mass. Arctic air moves into the region from the north and northwest during the winter, causing periods of extreme cold alternating with milder temperatures. Summer temperatures are usually warm, but some hot spells and occasional cool days can be expected.

Table 4-6 also represents the average monthly and annual rainfall for Rapid City collected during the 52-year period. The table shows that the annual average rainfall is 18.37 inches, with the highest rainfall occurring in May and June. The driest months are December and January.

4.11 WATER RESOURCES

This section describes surface water and groundwater resources in the study area. The study area for water resources is delineated as the study corridor shown in Figure 4-3.

4.11.1 Surface Water Resources

The primary surface water bodies in the project area are Rapid Creek and Dry Creek. Boxelder Creek is located 2 miles north of the eastern half of the study corridor. No other major rivers, lakes, streams, or reservoirs are located within several miles of the study area. Dry Creek flows discontinuously during much of the year.

TABLE 4-4
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
NATIONAL AMBIENT AIR QUALITY STANDARDS

	NAAQS ($\mu g/m^3$)					
Pollutant	1-hour	3-hour	8-hour	24-hour	Quarterly	Annual
PM_{10}	NA	NA	NA	150	NA	50
NO_2	NA	NA	NA	NA	NA	100
SO_2	NA	1,300	NA	365	NA	80
CO	40,000	NA	10,000	NA	NA	NA
Ozone	235	NA	157	NA	NA	NA
Lead	NA	NA	NA	NA	1.5	NA

Notes:

NA Not applicable
NAAQS National Ambient Air Quality Standards
$\mu g/m^3$ Micrograms per cubic meter

TABLE 4-5
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PM_{10} MONITORED VALUES

Station Name	Year	# of Data Collection Days Per Year	1st max 24-hr value ($\mu g/m^3$)	2nd max 24-hr value ($\mu g/m^3$)	Annual Mean ($\mu g/m^3$)
City Library	1995	355	92	83	24.0
	1996	365	82	75	22.6
	1997	342	70	69	23.9
	1998	348	62	59	24.0
	1999	120	55	50	18.8
	2000	88	57	55	21.6
National Guard Camp Armory	1995	61	99	79	33.0
	1996	58	151	74	35.2
	1997	62	91	91	39.7
	1998	116	86	80	29.2
	1999	113	109	91	26.0
	2000	90	87	83	31.0

Notes:

$\mu g/m^3$ Micrograms per cubic meter

TABLE 4-6

RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
MEAN MONTHLY TEMPERATURE AND RAINFALL

Time Period	Temperature °F	Rainfall (inches)
January	24.1	0.36
February	28.9	0.48
March	34.6	0.97
April	45.1	2.02
May	55.7	3.39
June	65.5	3.33
July	72.3	2.54
August	71.3	1.99
September	61.1	1.24
October	50.1	1.20
November	36.2	0.50
December	28.2	0.36
ANNUAL	47.8	18.37

Rapid Creek flows in an east-southeasterly direction in the study area and discharges into the Cheyenne River 30 miles east of Rapid City. Dry Creek flows in a primarily easterly direction within the project area and discharges into Rapid Creek approximately 0.5 mile south of the project corridor. Rapid Creek and Dry Creek are streams typical of the region, and their flow patterns closely match precipitation patterns. However, flow in Rapid Creek in the study area is influenced by the release of treated wastewater from Rapid City's public wastewater treatment plant located a mile east of the main developed area of Rapid City. The wastewater treatment plant discharges between 6 and 8 million gallons per day into Rapid Creek, according to Mr. John Wagner of the Rapid City Water Department (Tetra Tech 2001d). According to Mr. Wagner, surface water from Rapid Creek is used as a source of drinking water during the summer and for flood irrigation of farmland in the Rapid City floodplain. Numerous landowners claim water rights along Rapid Creek.

High flow events frequently result from snowmelt during the late winter and early spring. Streamflow data recorded by USGS at a gauging station downstream of the Rapid City wastewater treatment plant indicated that the maximum average daily flow, in cubic feet per second (cfs), was 743 cfs in June, 1998. The lowest flow, in terms of lowest daily mean flow, was 37 cfs in February, 2001 (USGS 2001). During the spring, storms increase soil moisture, decreasing the capacity for infiltration. Subsequent rainfall can result in both a high volume of runoff and high peak discharges. For example, an instantaneous peak flow of 1,310 cfs was recorded after a rainfall event in June 1998.

Surface water quality varies with the rate of streamflow in that the concentrations of total dissolved solids decrease and suspended solids increase as the rate of flow rises. Surface water in Rapid Creek is used regionally for crop irrigation and stock watering.

Other surface water in the project area occurs mainly as irrigation canals, isolated backwater areas and oxbows associated with Rapid Creek, and diked or impounded ponds in pastureland used for irrigation and stock watering. Numerous ephemeral streams and drainages pass through the project area, as well. Some of these ephemeral drainages are associated with wetlands, as discussed in Section 4.3. Irrigation ditches located in the project area include Cyclone Ditch, South Side Ditch, an abandoned canal ditch, and Lone Tree Ditch, as depicted in Figure 1-4. The corridor for the proposed project crosses or passes these ditches within 1 to 2 miles of Rapid Creek.

4.11.2 Groundwater Resources

Several regional aquifers underlie Pennington County. These aquifers are composed mainly of sandstone, limestone, and dolomite and are exposed only in small areas. The upper most consolidated geologic unit in the study area is the Pierre Shale, which dips eastward from the Black Hills. The recharge of the regional, confined aquifers is primarily at the outcrop areas where they are exposed at higher elevations around the core rocks of the Black Hills Uplift. Recharge also comes from upward leakage of deeper aquifers. It is unlikely any surface water recharge of the confined aquifers occurs in the study area.

The uppermost, confined aquifer most widely used as a source of water in the region between Rapid City and New Underwood, South Dakota, is the Dakota (Inyan Kara) Aquifer, a Lower Cretaceous sandstone unit. The Dakota Aquifer is confined by and lies beneath the Pierre Shale (Strobel and others 1999). The Dakota (Inyan Kara) Aquifer is exposed on the flanks of the Black Hills Uplift in Pennington County and extends more than 300 miles east of the Black Hills under most of South Dakota. The Dakota Aquifer tends to yield water that contains concentrations of dissolved minerals, that increase with distance from the recharge area. This aquifer is recharged in the Black Hills Uplift by upward leakage from deeper aquifers and where it is exposed at the land surface at the flanks or crests of anticlines (convex upward folds in rocks or rock layers). This water tends to be under high artesian pressure and generally flows at the surface.

Several smaller sand and gravel aquifers of Quaternary age are located above the Pierre Shale layer throughout the region; however, water resources from these smaller units tend to be inconsistent in the quantity they can produce. The surficial sand and gravel aquifers are primarily associated with stream valleys, although some terrace gravels are locally saturated. The surficial aquifers are recharged by streamflow, precipitation, and infiltration of irrigation water. These aquifers discharge to the local streams. The Pierre Shale underlying these aquifers prevents much downward infiltration from occurring. The Quaternary aquifers are relatively insignificant sources of supply (Strobel and others 1999).

The primary drinking water supply aquifer for the Rapid City area is the upper Paleozoic age aquifer composed of the limestones and dolomites of the Madison group (Strobel and others 1999). According to Mr. John Wagner (Tetra Tech 2001d), the majority of wells in the rural area east of Rapid City are screened in the Madison Aquifer at depths ranging from 1,000 to 2,500 feet below ground surface. However, a few wells are screened in the shallow alluvium of Rapid Creek. There are approximately 300

to 400 wells within 4 miles of the project corridor (USGS 2001). Wells in this area range in depth from approximately 16 to 3,280 feet below ground surface. Depending on local water quality, well water is used for drinking, stock watering, and irrigation. The proposed transmission line would not directly cross water lines; however, four groundwater monitoring wells are located within 100 feet of the project corridor near the city landfill in the western portion of the project corridor.

4.12 AESTHETICS

The region that comprises the Rapid City Tie Project study area is characterized by rolling grasslands and rangeland from Rapid City to the southwest and from the town of New Underwood to the northeast. The western portion of the study corridor is located in the foothills of the Black Hills, which are visible within several miles west of the project area. Features in the foothills area consist of stands of trees and shrubs in the drainages, as well as steep hills in areas farther east of Rapid City. The central portion of the study area, consisting of crop and rangeland, passes through the flat floodplains of Dry Creek and Rapid Creek. The New Underwood area is not visible from nearby roads within the study area and consists of cropland and rangeland among hills and drainages. Twenty-three photographs of the study area are presented in Appendix A with an accompanying map showing each location.

The Rapid City Regional Airport is located 1.6 miles north of the corridor and extends into the study area. Seven radio towers are located north and northwest of the project area. A landfill is located south of Rapid City, within the city limits but outside the study area. An auto salvage yard is located adjacent to the proposed alignment northwest of the proposed converter station site within the study area.

Roads, power lines, fencing, and railroads transect the study area, and scattered farmsteads and irrigated agricultural areas are scattered throughout the region (Appendix A). Much of the existing landscape has been modified by human activity in the past, and conversion of native grassland to rangeland and cropland and removal of shrubs along drainages have altered the viewscape. No scenic drives, trails, or viewpoints exist in the study area.

4.13 TRANSPORTATION

This section presents the transportation routes in the vicinity of the proposed transmission line, substation, and alternatives. The study area for transportation resources is defined as the project corridor and nearby airport. The proposed transmission line path stretches approximately 23 miles. This length of the

transmission line would cross two state highways, paved roads and unpaved roads, and an active railroad line, as shown in Figure 4-8 (USGS 1953 a, b, c, d; DeLorme 2000). The transmission line also runs adjacent and parallel to three different sections of road, for a total of 4.5 miles. In addition, two airports are within 10 miles of the proposed path of the transmission line. The following sections describe the various transportation routes, indicates where the transmission line crosses these routes and, in the case of airports, describes the proximity of the proposed transmission line to aircraft runways and flight space. Figure 4-8 presents the names and locations of transportation routes that cross or run adjacent and parallel to the proposed path of the transmission line. This figure also lists the primary and secondary names of transportation routes that cross or run adjacent and parallel to transmission line path and describes the functional classifications of primary transportation routes.

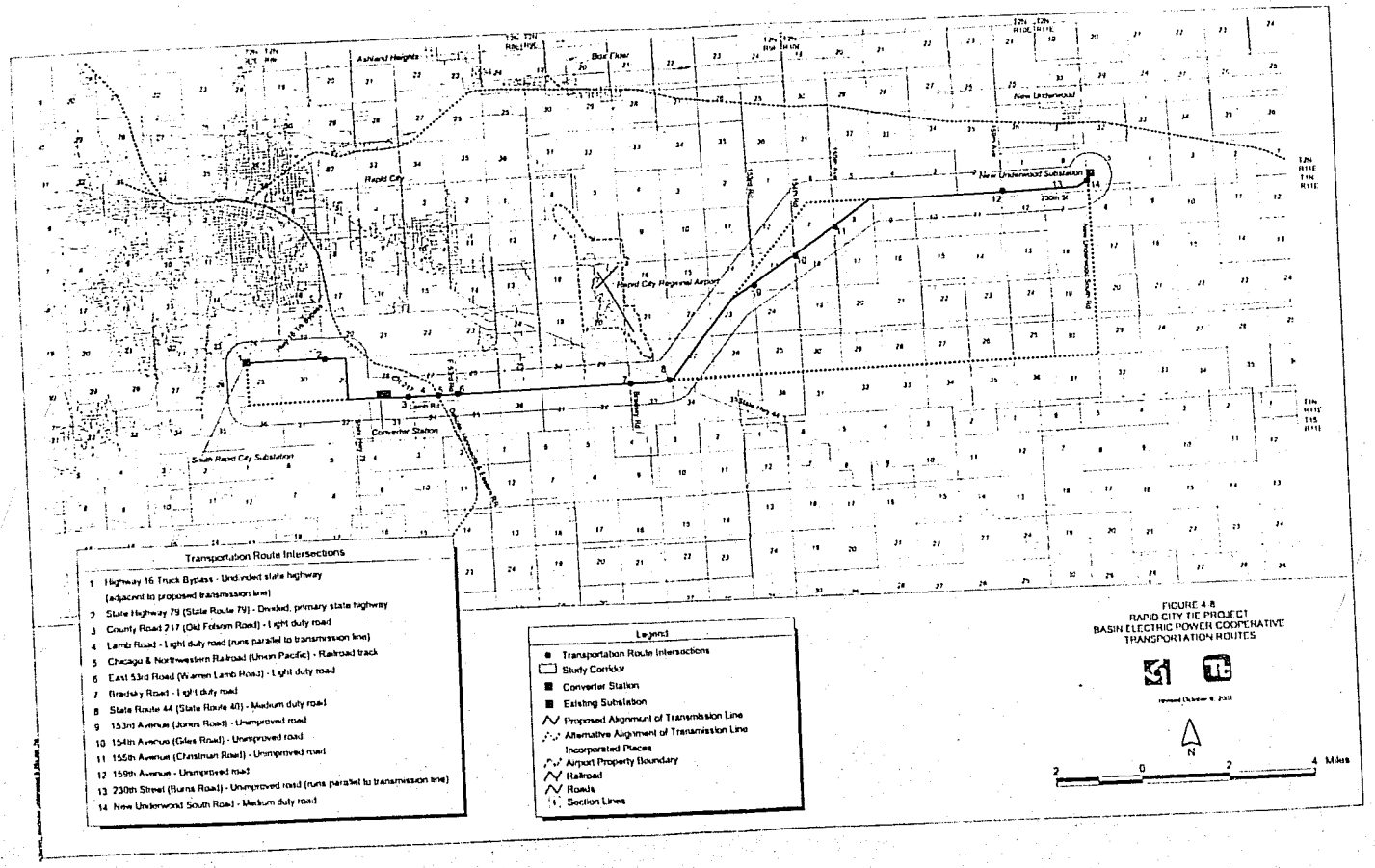
4.13.1 Highways

As shown in Figure 4-8, the proposed path of the transmission line and alternatives would cross two major state highways (SD 79 and SD 44) (SDDT 1991, 1999, 2000, 2001). SD 79 is crossed by the study area 2 miles east of the South Rapid City Substation. SD 79 is a primary highway that runs south out of Rapid City through the town of Hermosa and connects with SD 385 about 5 miles east of Hot Springs, South Dakota. The second state highway that is crossed by the study area is SD 44. SD 44 is a medium duty, minor arterial highway that goes from Rapid City southeast to Scenic, South Dakota. The proposed transmission line would cross this highway 6 miles east of the proposed converter station property on an east-west section line, approximately at the point where the transmission line turns 45 degrees and heads northeast.

4.13.2 Roads

Areas between major highways are served by a network of unpaved roads (ranging from gravel-surfaced county roads to unmaintained 4-wheel drive trails) and paved roads. Notable tertiary access points include County Road 217 (Old Folsum Road), Lamb Road, East 53rd Street (Warren Lamb Road), Bradsky Road, 153rd Avenue (Jones Road), 154th Avenue (Giles Road), 155th Avenue (Christman Road), 159th Avenue, and 230th Street (Burns Road).

Two roads pass through the tract of land proposed for the converter station. County Road 217 (Old Folsum Road) runs through the property for approximately 0.5 mile from the northern boundary to the southeastern corner.


Ashland Heights
Box Elder
Rapid City
New Underwood
New Underwood Substation
230th St
Rapid City Regional Airport
Converter Station
South Rapid City Substation
Transportation Route Intersections
1 Highway 16 Truck Bypass - Undivided state highway (adjacent to proposed transmission line)
2 State Highway 79 (State Route 79) - Divided, primary state highway
3 County Road 217 (Old Folsom Road) - Light duty road
4 Lamb Road - Light duty road (runs parallel to transmission line)
5 Chicago & Northwestern Railroad (Union Pacific) - Railroad track
6 East 53rd Road (Warren Lamb Road) - Light duty road
7 Bradley Road - Light duty road
8 State Route 44 (State Route 40) - Medium duty road
9 153rd Avenue (Jones Road) - Unimproved road
10 154th Avenue (Giles Road) - Unimproved road
11 155th Avenue (Christman Road) - Unimproved road
12 159th Avenue - Unimproved road
13 230th Street (Burns Road) - Unimproved road (runs parallel to transmission line)
14 New Underwood South Road - Medium duty road
Legend
Transportation Route Intersections
Study Corridor
Converter Station
Existing Substation
Proposed Alignment of Transmission Line
Alternative Alignment of Transmission Line
Incorporated Places
Airport Property Boundary
Railroad
Roads
Section Lines
FIGURE 4-8
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
TRANSPORTATION ROUTES
N
2 0 2 4 Miles

4.13.3 Railroad Lines

The proposed transmission lines would cross two railroad lines (SDDT 1998). The abandoned Chicago, Milwaukee, St. Paul and Pacific railroad line (a South Dakota-owned railroad) runs parallel with SD 44 as it heads southeast out of Rapid City. The proposed transmission line and alternatives would cross an abandoned portion of this railroad line at approximately the same location as SD 44. The proposed transmission line and alternatives also would cross the DM&E railroad (Figure 4-8). The DM&E railroad heads south and then southeast from Rapid City and then turns and travels southwest after it crosses the proposed transmission line and alternatives along an east-west section line 0.5 mile east of the proposed substation.

4.13.4 Adjacent Airports

Two aircraft runways are located outside, but in the vicinity, of the study corridor. Ellsworth Air Force Base is active and is located north of the study area. The aircraft runway at the Air Force Base runs from the northwest corner to the southeast corner of the base and is within 7.75 miles of the path of the proposed transmission line. At its closest location, the transmission line runs perpendicular with the main Air Force landing strip. Ellsworth Air Force Base is an active base; however, at a distance of 7.75 miles from the route of the transmission line, interference with flight space is not a concern.

The second airfield in the area is the Rapid City Regional Airport (Figure 4-8). The primary aircraft runway for this airport runs from the northwest to the southeast and is within 1.6 miles of the path of the transmission line, 1 mile west of the intersection of the proposed transmission line and SD 44. This 1.6-mile distance is also observed along the path of the proposed transmission line, 0.5 mile northeast of the intersection. After airport property lines (BWRC 1997) and airport threshold and control tower limits (FAA 2001a, b) were evaluated, it was determined that the location of the proposed transmission line (1.6 miles south of the southern runway touchdown point with transmission lines 110 feet high) does not infringe into the boundaries of the airport and allows for 1,480 vertical feet of clearance below the southern flight approach path.

4.14 NOISE AND RADIO AND TELEVISION INTERFERENCE

Transmission lines and substations are often associated with electrical effects including radio and television interference. The electrical characteristics of the environment around transmission lines and substations are primarily caused by electric and magnetic fields (EMF) associated with the voltage

(electric field) and current (magnetic field) that passes through the equipment. EMF extends from the conductors of transmission lines and substation equipment and decreases with distance from the facilities.

The relative strength of the fields in the vicinity of the facilities is influenced by location, spacing and arrangement of the conductor, voltage and current, and other engineering considerations.

The electric current at the surface of the conductors is responsible for an effect referred to as the "corona," or the electrical breakdown of the air into charged particles. The electric field from the energized conductors of a transmission line may cause corona to occur on the conductors, insulators, and hardware of electric lines. Corona on conductors occurs when EMF has been augmented by such influences as water drops, nicks, or insects. The corona may result in audible noise, electromagnetic interference with radio or television signals, and visible light.

Corona effects are small during fair weather but increase when moisture is present, for example during fog or rain. Audible noise generated from corona on transmission lines is generally described as a crackling, hissing, or humming noise. Interference with radio and television signals associated with a corona on transmission line conductors is caused by electromagnetic noise generated at the transmission frequencies for radio (especially the AM band) and television signals. Radio and television interference is also caused by spark gaps on distribution and low-voltage transmission lines. Conditions such as mechanical failure, vibration, or corrosion in a conductor can result in a loss of connection, allowing voltage to develop. If the voltage is sufficiently large, a spark can be generated that may result in audible noise or radio and television interference. Mobile telephone and citizen's band radio signals are rarely, if ever, disrupted by corona since they operate at different frequencies than noise generated by a corona.

This section describes existing conditions for noise and television and radio interference in the affected environment. The study area is shown as the study corridor.

4.14.1 Noise

The study area is predominantly rural, and existing ambient noise levels along much of the corridor for the proposed project and are generally low because the land is undeveloped or is used for agriculture. Elevated levels of noise occur in the portion of the project area west of the crossing with SD 44 (Figure 4-8) and are associated with aircraft, automobile, rail, and truck traffic, and farm equipment. The project corridor crosses an active rail line, and two highways (SD 79 and SD 44) and extends parallel to existing roadways throughout much of the western portion of the project area. In addition, development west of the study area with residential, commercial, and industrial facilities is under way at a fairly rapid

pace, thus subjecting the study area to noise associated with construction. The eastern portion of the project area consists of large tracts of pasture, crops, rangeland, and undeveloped grassland, with unpaved and infrequently traveled roads, typically constructed along section lines. Primary sources of noise in the eastern portion of the project area include wind, livestock, wildlife, farm equipment, and farm truck traffic.

Topography within the study corridor is mostly open, gently rolling agricultural land with scattered woodlands. This terrain is unlikely to have any noticeable effect on the propagation of noise from sources within the corridor.

4.14.2 Radio and Television Interference

The majority of the study corridor passes through uninhabited agricultural land. The only areas within the study corridor where television or radio interference would be of concern are along roadways, where radio or television signals would be temporarily disrupted in vehicles, or near residences, commercial developments, or public facilities that receive radio and television signals via antennas. However, a significant portion of the proposed alignment is collocated with existing electrical transmission lines that would be re-hung on poles associated with the proposed project. These existing power lines are the primary sources of EMF in the study area, although other electrical equipment also produces low levels of EMF.

4.15 HUMAN HEALTH AND SAFETY

This section summarizes the present human health and safety conditions that exist within the study area for the Rapid City Tie Project. The human health and safety study area is defined in Section 4.15.2. T. pics reviewed in this section include electrical effects, schools, health facilities, and existing hazardous waste sites.

4.15.1 Electrical Effects

Direct contact with electric conductors from transmission lines is commonly referred to as shock hazard. Transmission lines, as with household electrical wiring, can inflict serious electric shocks if precautions are not taken to minimize shock hazard. Avoidance of objects, such as antennas and irrigation equipment, near the ROW for the transmission line is a proper precaution that should be observed. All of Basin Electric's lines are designed and constructed in accordance with National Electrical Safety Code (NESC) standards to minimize shock hazard.

The flow of electricity produces electric and magnetic fields (commonly referred to as EMF). Magnetic fields and electric fields are strongest at the source of the flow of electrical power and drop off markedly as the distance from the source of the current increases. In many cases, people are exposed to higher EMF levels from household appliances than from transmission lines as a result of the proximity of the source.

Numerous sources of EMF exist in nature and in the occupational and residential environments. In nearly all instances, these fields pose no obvious threat to human health or safety. However, public awareness of the ubiquitous nature of these fields, and the historical controversy over their potential effects on living systems, have stimulated the research community to define more precisely the physical properties of these fields and to delineate the thresholds for their possible effects on human health and the environment.

Certain epidemiological investigations have indicated potential risk factors in a number of residential and occupational studies for exposure to EMF. However, many studies report no statistically significant correlation. A recent Danish residential study reported that while consumption of electricity in Denmark has increased by 30 times since 1945, incidence rates of cancer had changed little (Guenel and others 1993). In 1996, the National Research Council (NRC) completed a study of research on EMF that had been ongoing since 1979 and concluded that the evidence so far "does not show that exposure to these fields presents a human health hazard" (NRC 1996).

In conclusion, although a substantial amount of research on EMFs has been completed and is continuing, the body of research on health effects is still preliminary and inconclusive. The emerging evidence no longer allows the assertion that there are no risks; still, there is no basis for arguing that there is a significant risk.

4.15.2 Schools and Health Facilities

A records review of the state database identified potentially affected schools and health facilities. Sites within a 0.5-mile range of the potential corridor were considered to be in the study area. Under current conditions, the proposed project corridor and alternatives do not pass within 0.5 mile of a school or health care facility where exposures to EMF from the project might occur. In addition, the proposed corridor passes within 200 feet of only two residences.

4.15.3 Hazardous Waste Sites

A records review of various federal and state databases identified areas of potential contamination within the project area. Sites within 0.5 mile of the proposed corridor were considered to be in the project area. Nine underground storage tanks (UST), three Resource Conservation and Recovery Act (RCRA) sites (Merillat Industries Inc., Delta Airlines, and Rapid City Area School Warehouse), and one State Solid Waste Landfill, Rapid City Landfill, were identified by the databases as within 1 mile of the proposed corridor. In addition, the South Dakota Department of Environmental and Natural Resources (SDDENR) reported six spills or releases between 1997 and 2000 within a 1-mile radius of the proposed corridor (SDDENR 2001).

4.16 SOCIOECONOMIC CONDITIONS AND COMMUNITY RESOURCES

This section summarizes the socioeconomic conditions and community resources in Pennington County and the greater Rapid City metropolitan area that comprise the study area for the affected environment. Specifically, this section addresses population, economic conditions, income, employment, housing, local government facilities and services, and utilities.

4.16.1 Population

The project area is located in Pennington County and is south and east of the greater Rapid City metropolitan area. The population of Pennington County in 2000 was estimated at 88,565 (Census 2001). According to the 2000 U.S. Census, the population of Rapid City proper is 59,607. Table 4-7 lists the major communities and associated populations that could be affected by the project. The 1999 population in the Rapid City metropolitan statistical area was 88,117 (Census 2001).

4.16.2 *Economic Conditions*

The major industries in Pennington County in 1999 were trade, services, government, and manufacturing (GOED 2001). Table 4-8 lists employment by industry for Pennington County in 1999. In the Rapid City area, Ellsworth Air Force Base employs 3,967 and is the largest employer, with Rapid City Regional Hospital a close second at 3,866 employees (GOED 2001). The Rapid City School District is the third-largest employer with 1,934 employees, and Conseco Financial Corporation is the fourth largest with 1,300 employees (GOED 2001). The unemployment rate in the Rapid City metropolitan statistical area was 2.06 percent in 2000. This rate decreased from the 1990 rate of 3.36 percent (Census 2001).

TABLE 4-7

RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
POTENTIALLY AFFECTED POPULATIONS - RAPID CITY METROPOLITAN AREA

Area	1990	2000
State of South Dakota	696,004	754,844
Pennington County	81,343	88,565
Box Elder	2,680	2,841
Ellsworth AFB	7,017	4,165
New Underwood	553	616
Rapid City	54,523	59,607
Rapid Valley	5,968	7,043

Source: U.S. Census 2001

TABLE 4-8
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PENNINGTON COUNTY 1999 EMPLOYMENT BY INDUSTRY

Industry Category	Number of Employees	Percent of Employees
Services	14,154	30%
Trade	13,927	29%
Government	6,324	13%
Manufacturing	4,499	10%
Mining and construction	3,216	7%
Financial and insurance	2,958	6%
Transportation and utilities	1,998	4%
Agriculture, forestry, and fishing	268	1%

Source: South Dakota Governor's Office of Economic Development 2001

In 1998, per capita personal income (PCPI) in Pennington County was $23,858. This PCPI ranked 17th in the state, and was 101 percent of the state average, $23,715, and 88 percent of the national average, $27,203. In 1988, the PCPI for Pennington County was $14,885 and ranked 11th in the state. Between 1988 and 1998, the average annual rate of growth in PCPI was 4.8 percent. During the same period, the average annual growth rate for the state was 5.6 percent and for the nation was 4.6 percent (BEA 2001).

The major communities or subdivisions in the study area are shown in Figure 4-9. In the last 2 years, 495 single-family houses and 306 multiple living units were built in the Rapid City area (GOED 2001). In 1998, the average cost of a three-bedroom house was $98,168, and the average monthly rent for a two-bedroom apartment was $560 (RCAEDP 2001).

4.16.3 Environmental Justice

In accordance with Executive Order 12898, an evaluation of the proposed action must include an assessment of effects on minority and low-income populations, and an alternative location or action must be considered if the proposed action discriminates against a minority or low-income population. The population of the Rapid City metropolitan statistical area for 1999 by race and sex is displayed in Table 4-9. In 1999, the minority population in the Rapid City metropolitan statistical area was 15.3 percent (SDDOL 2001). By comparison, the minority population in the State of South Dakota is 10.6 percent (SDDOL 2001). In 1997, approximately 14.3 percent of the population of Pennington County was below the poverty level compared with 14 percent of the population of South Dakota as a whole below the poverty level (Census 2001).

4.16.4 Local Facilities, Services, and Utilities

Rapid City is divided into four main areas: South Robbinsdale and North Rapid City make up the bulk of the residential area, with the downtown core separating these neighborhoods. West Rapid City is a sprawling, primarily residential neighborhood. Wide traffic arteries provide easy access between neighborhoods. Schools, churches, shopping centers, and other services are located throughout the city, and a 7-mile-long greenbelt parallels Rapid Creek through town. Rapid City provides a wide array of governmental services including law enforcement, fire protection, road and bridge infrastructure, solid waste disposal, medical and ambulance, public libraries, and education. There are numerous cultural and recreation opportunities within the greater Rapid City metropolitan area, including: public golf courses and tennis courts, bicycle trails, public parks and ball fields, recreation centers, a civic center, and museums. The public facilities and services, particularly the infrastructure, adequately serve the existing population and could support future growth. The electric, natural gas, water, sewer, and telecommunication utilities and services of the Rapid City area are described in more detail as follows.

TABLE 4-9
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
1999 POPULATION BY RACE AND SEX – RAPID CITY METROPOLITAN AREA

Race	Total Population		Female Population	
Total Population	88,117	100.0%	44,643	50.7%
Caucasian	77,556	88.0%	39,108	44.4%
African-American	2,004	2.3%	863	1.0%
American Indian or Alaskan Native	7,214	8.2%	3,871	4.4%
Asian or Pacific Islander	1,342	1.5%	801	0.9%
Hispanic	2,899	3.3%	1,379	1.6%
Total Minority	13,459	15.3%	6,915	7.8%

Notes:

The number of Hispanics is included in the total minority population category, but is excluded from Total Population.

Source: South Dakota Department of Labor 2001

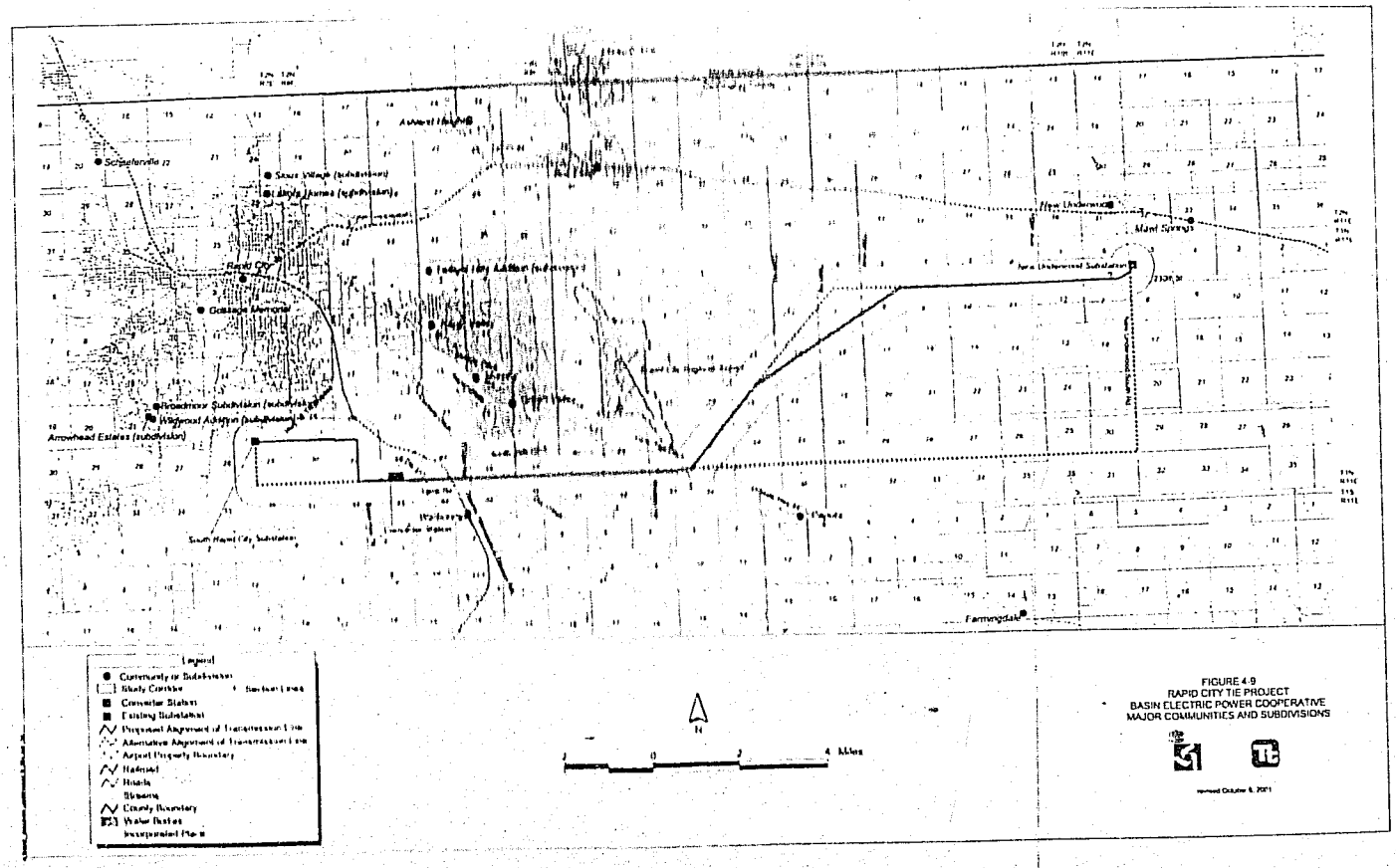


FIGURE 4-9
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
MAJOR COMMUNITIES AND SUBDIVISIONS

Revised October 5, 2001

Electric - South Dakota has one of the lowest costs of energy in the nation. Retail electric service in the Rapid City area is provided by Black Hills Power and Light (BHP&L), Black Hills Electric Cooperative (BHEC), and West River Electric Association (WREA). BHEC and WREA are members of Rushmore Electric Power Cooperative, which is a member of Basin Electric. BHP&L is a shareholder-owned utility that serves 56,000 customers with local offices throughout a 9,300-square-mile area in western South Dakota, eastern Wyoming, and southeastern Montana (RCAEDP 2001).

Natural Gas - Montana-Dakota Utilities (MDU), a division of MDU Resources Group, Inc., supplies natural gas to more than 180,000 customers in Montana, North Dakota, South Dakota, and Wyoming (RCAEDP 2001). MDU serves Rapid City proper and the surrounding communities of Rapid Valley, Box Elder, Black Hawk, Piedmont, and Ellsworth Air Force Base.

Water - Rapid City supplies water to the city, Ellsworth Air Force Base, Lakota Homes, and to Rapid Valley, Chapel Lane, and the City of Box Elder on a stand-by basis. The city obtains water from the Rapid Creek Drainage Area through the water treatment plant and infiltration galleries along Rapid Creek, through Minnilusa Wells, and through Madison Wells (RCAEDP 2001).

Sewer - Rapid City maintains the wastewater treatment system. The treatment plant has a capacity of 13.5 million gallons per day and uses an advanced, mechanical-biological system (RCAEDP 2001).

Telecommunications - The Black Hills of South Dakota offers a strong telecommunications infrastructure. Businesses are served by Points of Presence (POP) for three major long-distance carriers: AT&T, MCI, and Sprint. A full POP is available in Rapid City. Qwest Communications International, Inc. (Qwest) offers businesses and residential customers a wide range of communication services. All Qwest customers are served by digital call-switching systems, and every community is connected via a fiber-optic network (RCAEDP 2001). Black Hills FiberCom, a subsidiary of Black Hills Corporation, is a competitive local exchange company that is investing $50 million in a state-of-the-art fiber optic network to serve the growing needs of Rapid City and the Northern Black Hills (RCAEDP 2001).

5.0 ENVIRONMENTAL IMPACTS

This section describes potential environmental impacts from the Rapid City Tie Project. Direct, indirect, and cumulative impacts are addressed considering short- and long-term consequences. Potential impacts are based on the information developed in Section 4.0, and mitigation of potential impacts is discussed in Section 6.0. The following sections summarize potential impacts from the Rapid City Tie Project to land use, floodplains, wetlands, cultural resources, threatened and endangered species, fish and wildlife resources, vegetation, geological resources, coastal areas, air quality, water resources, aesthetics, transportation, noise, radio, and television interference, human health and safety, and socioeconomic and community resources.

5.1 LAND USE

The proposed project would have a minimal impact on land use. The majority of the proposed transmission line traverses private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances. The 23-mile transmission line will require 295.7 acres of new ROW along approximately 23 miles and 40 acres for the new converter station. The transmission line will cross 34 parcels of land, which are owned by 20 individual landowners. The remaining land consists of both nonagricultural private and public lands such as the highway maintenance yard, a sanitary landfill, SD 79, SD 44, and the DM&E railroad line.

The short-term impacts would include disruption of vegetation and farming caused by:

- Preparing equipment yards and sites for construction trailers
- Clearing, grubbing, grading, and drilling hole foundations for installation of transmission poles
- Temporary closure of access to livestock and farm irrigation, tilling, and harvesting operations

The short-term disturbances to vegetation would be repaired soon after construction is completed. Most disturbances to farming would be expected to be infrequent and would last only a day per disruption.

The long-term impacts would include disruption of vegetation and farming caused by:

- Installation of two-track access roads

- Ongoing maintenance along the route of the power line
- Installation of a section line road to access the site of the converter station
- Loss of crops, hay, or livestock forage within the right of way and the construction area for the substation

The removal of vegetation for the access roads would slightly increase erosion. The small conversion of agricultural land to the transmission line right of way and substation construction area could have a small impact on overall crop production.

The cumulative impact of the utility line corridor would be anticipated to have minimal effect on land use. The primary land use in this project area consists of ranching and farming: these practices have been changing the landscape for many years. Future practices may continue to change land use. This and future projects should have minimal impacts on land use.

5.2 FLOODPLAINS

The proposed project is expected to have minimal impacts on floodplains. The area of primary impact to existing floodplains from construction of the proposed transmission line would be at the Rapid Creek floodplain crossing just west of the intersection of the alignment of the proposed transmission line with SD 44. Up to six towers would be constructed within this section of floodplain: because of the undulating nature of Rapid Creek, the towers would span the river in four locations. The transmission corridor (125 to 133 feet wide) would cross approximately 13 acres of land designated as 100-year floodplain. The proposed transmission line routing may also affect two lesser floodplain areas associated with Dry Creek.

Potential direct and indirect impacts to the existing floodplains of Rapid and Dry Creeks are anticipated to be insignificant. These impacts could occur as a result of:

- Creating barriers that could unnaturally divert flood waters or increase flood hazards in other areas
- Altering the natural floodplains and protective barriers that help channel or accommodate flood waters
- Creating scour and other turbulence that could erode channel banks

Finally, poles could pose hazards during floods if they are not adequately secured to prevent collapse or movement.

5.3 WETLANDS

The proposed project is expected to have a minimal effect on wetlands. Approximately 2 acres of wetlands are located within the 125 to 133-foot wide proposed project corridor. All wetlands and associated buffer areas crossed by or near the proposed transmission line corridor are narrow (less than 130 feet wide within the corridor) and are located in low areas between hills or draws. Poles for the proposed project typically would be spaced at 750-foot intervals and would be located on hilltops, along ridges, and away from low areas.

The majority of the proposed project alignment makes use of areas near or adjacent to existing access or farm roads. However, access roads are not present along much of the central portion of the proposed alignment that runs diagonally through pasture and farmland. Although wetlands would not be affected by operation of the transmission line itself, temporary impacts (less than 1 year in duration) may occur during construction and maintenance if vehicles travel across wetlands for access to the transmission corridor.

Based on the temporary nature of potential impacts, the effects of the proposed project would be insignificant. The potential direct impacts to wetlands from construction and maintenance of the proposed transmission line could include the following:

- Wetland vegetation may be crushed by heavy machinery during construction.
- Wetland soils may be compacted during construction by vehicles or equipment. When soils are compacted, runoff increases and water-holding capacity is reduced, leading to impaired function of the wetland.
- If access roads are constructed in wetlands, the amount and direction of water flow can be changed, permanently damaging wetland soils and vegetation.
- Sediments can be resuspended by equipment, foot traffic, and vehicles, endangering fish and other wildlife.

Potential indirect impacts to wetlands in and near the proposed transmission alignment are also anticipated to be minor, but may include:

- Destruction of native wetland plants, as could occur when vehicles or crews cross wetlands, can in turn promote invasion by weedy vegetation that does not provide food and nesting habitat for wildlife.

- Compaction of wetland soils by vehicles or crews could impede germination of perennial seeds, root growth, and establishment of plants, thereby displacing native plants. Bare areas could develop that are more susceptible to erosion by water and wind in areas where plants are not established. Erosion could impair water quality by compromising the capacity for pollution filtration and sequestering the wetland.

- Construction equipment can carry seeds or parts of invasive plant species into wetlands which can crowd out native vegetation and destroy wildlife habitat.

Based on existing land uses and projects within and near the project corridor, the single most significant contributor to cumulative impacts to wetlands in the study area is cattle and ranching operations, including cattle that cross and enter wetlands and impacts to wetlands by rancher vehicles.

5.4 CULTURAL RESOURCES

The proposed project is expected to have minimal impact on cultural resources. The potential impacts for each site are discussed below. The cultural resources report is included as Appendix B.

Archeological Site 39PN1974

This site is a single rock cairn located on the bluffs over Rapid Creek. Aboriginal stone cairns do not usually meet NRHP criteria. They may, however, have had a spiritual function, or have served as graves in some cases for Native Americans. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected so long as construction avoids the cairn.

Archaeological Site 39PN1975

Site 39PN1975 consists of both a minimal aboriginal artifact scatter and a single stone cairn on the heights overlooking Boxelder Creek. An examination of the area, including shovel tests, did not turn up additional artifacts beyond the two flakes noted. There does not appear to be any likelihood of a buried component at the site. The artifact scatter does not appear to contribute to the site's potential significance. The cairn, like that of Site 39PN1974, may have been of spiritual significance to Native Americans. It is recommended that the site receive a Section 106 finding of No Historic Properties Affected if construction avoids the cairn.

Archaeological Site 39PN1976

This site consists of a stone-lined well and a leveled platform for some sort of farm or ranch outbuilding. It does not appear to meet Criteria A–C for inclusion on the NRHP. Given its lack of building foundations and minimal use, it has little potential to meet Criterion D for the NRHP, either. A Section 106 finding of No Historic Properties Affected is recommended for the site.

Historic Site PN-000-00452

This site is a historic bridge on an abandoned road grade. The structure is small and of the concrete slab variety. It is common in South Dakota, and this bridge lacks integrity, since the concrete railings were destroyed. It does not appear to meet the criteria for the NRHP. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

Archeological Site 39PN2007

The Chicago, Milwaukee, and St. Paul Railroad has received the "2007" site designation statewide; it is a linear archaeological site that runs for several hundred miles. The site has been determined eligible for inclusion on the NRHP by the State Historic Preservation Officer. The 100-foot wide segment crossed by the project ROW lacks any structural features or associated sites, consisting only of the grade, tracks, and ties. It is a redundant section and does not appear to be a contributing segment of the site with respect to NRHP eligibility. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

Rapid Valley Irrigation Ditches

The Rapid Valley irrigation ditches are considered eligible for inclusion on the NRHP because the Lower Rapid Valley Ditches are significant for their association with the development of irrigated agriculture in South Dakota. The ditches are representative examples of irrigation systems constructed, maintained, and operated by farmers.

The proposed project crosses the Cyclone, South Side, and Lone Tree ditches at points that consist only of the often-dredged earth ditches – no structures or associated sites are present. The segments of the ditches

themselves seem to be noncontributing parts of the site. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

5.5 THREATENED AND ENDANGERED SPECIES

During the field reconnaissance, approximately six potential bald eagle roost or feeding trees were identified that may be in the path of the transmission line. Upon a more detailed examination, no bald eagle roosts or nests could be verified at these sites. In addition, the field reconnaissance identified several additional potential bald eagle roost or feeding trees along Dry Creek and Rapid Creek. At this time, there is no evidence that the six trees that may be in the path of the proposed transmission line have been used as roosts or feeding trees for bald eagles. If roosting or nesting bald eagles are encountered during construction, Basin Electric will cease construction activities in the vicinity of the roosting or nesting trees and work with the USFWS to develop a mitigation plan that is appropriate and acceptable.

5.6 FISH AND WILDLIFE RESOURCES

The proposed project construction is not expected to significantly disrupt wildlife in the area. The area in and around the study corridor is dominated by rangeland, pasture, and cropland habitats. Wildlife in these habitats is made up of species adapted to urban, grassland, and riparian areas such as deer, antelope, prairie dogs, grouse, ducks, geese, hawks, eagles, and songbirds. Domesticated animals raised in the region include cattle, sheep, and hogs.

This project would have minor direct and indirect impacts on wildlife. Short-term construction noise and activities could affect wildlife by temporarily frightening them from the area. Construction of transmission poles might temporarily displace wildlife because of a short-term loss of habitat. Only small areas in the project corridor would be affected and only minimal portions would be disturbed by installation of poles. The increase in human activity in the project area might also temporarily disturb wildlife.

The addition of the power lines could have long-term impacts by increasing the mortality of birds, raptors, and waterfowl. Collisions are a concern for birds and waterfowl, especially in riparian areas. Additionally, most raptors are intolerant of human activity during the breeding season, and a decline in raptor nesting within the project area may occur during the project. Raptor electrocution is also a concern with electrical poles and wires.

Construction of the converter station could result in the permanent loss of prairie dog habitat. Twenty acres of black-tailed prairie dog town would be permanently removed for construction of the substations and access roads. Other species may be indirectly affected. Prairie dogs are an important source of food for many predators, and a variety of species use their burrows for habitat. In addition, the new power poles would create new perches in the area where few trees exist, creating new hunting opportunities for raptors including eagles.

Past and future projects in the area may have cumulative impacts on wildlife. Impacts include the loss of natural habitat caused by increasing residential, commercial, and agricultural development. The black-tailed prairie dog is the most likely to be affected. It is a keystone species of the short- and mixed-grass prairie. Considered a nuisance by ranchers and farmers, habitat conversion, shooting, poisoning, and sylvatic plague have caused black-tailed prairie dog populations to plummet to 1 percent of their historical levels. The converter station, built on prairie dog habitat, would affect both the prairie dog and the species that rely on them for food or shelter, such as the black-footed ferret. USFWS has noted that the black-tailed prairie dog is a species of concern, but the agency has not yet listed the black-tailed prairie dog as threatened.

5.7 VEGETATION

Impacts to vegetation in the project area are anticipated to be minor. Ranching is the principal land use in the project area and region, with approximately 60 percent of the acreage in rangeland; about 20 percent is used for cultivated crops or tame pasture and hay. The remaining is cropland converted to grassland under CRP.

Short-term impacts (that affect vegetation for 1 year or less) could include disturbance, removal, and soil compaction caused by:

- Conducting ground control surveys
- Performing geotechnical investigations
- Preparing equipment yards and construction trailer sites
- Clearing, grubbing, grading, and drilling hole foundations for installation of transmission poles

These short-term disturbances would be repaired soon after construction is completed. Most areas affected by short-term disturbances would be returned to natural grassland within one growing season.

Long-term impacts could be caused by installation of power poles, access roads, and the converter station, as well as ongoing maintenance along the route of the power line. Removal of the vegetation could increase erosion and temporarily reduce the diversity in plant species. Shrubs and trees are slower to establish; therefore, a diverse vegetative cover would be reestablished within a decade.

Construction associated with the project may have minor indirect effects on vegetation in the project area by increasing the potential for establishment of noxious weeds. Disturbed soil creates a hospitable environment for invasion of weeds, and project-related traffic may provide a transport mechanism for seeds of noxious weeds to the area. Removal of vegetation may increase erosion and sedimentation. Increased runoff on bare and compacted soils could create gullies and change the overall landscape.

Cumulative impacts to vegetation are anticipated to be minor and include the effects from farming and ranching. The primary land use in the project area consists of ranching and farming: these practices have been changing the landscape for many years. Past aerial photographs show pines and sagebrush dotting the landscape and shrubs lining drainages. Current aerial photographs show few pines in the project area and indicate that shrubs in the drainages have been removed. Future agricultural use of the area may continue to change the landscape. More natural areas will be lost as land is developed for residential, commercial, and industrial use. The area along the project area is mainly rangeland and cropland with urban developments near New Underwood and Rapid City. This and future projects should have an insignificant impact on vegetation, as most areas have been altered from their natural state.

5.8 GEOLOGICAL RESOURCES

This section presents the impacts of the proposed project to the geological resources in the project area.

5.8.1 Geology

No potentially hazardous geologic areas, such as slumps or landslides, would be affected by construction of the converter station or associated power poles and towers. As a result, no direct, indirect, or cumulative impacts to geologic resources are anticipated by the project.

5.8.2 Topography

The proposed project would make use of existing hilltops and ridges for construction of poles and towers and a flat area for the converter station. No significant grading or earthmoving would be required. As a result, no direct, indirect, or cumulative impacts to topography are anticipated by the project.

5.8.3 Soils

Impacts to soils from the proposed project would be insignificant. As many as 150 acres of soil could be disturbed during construction of tower sites, the converter station, and the access road for the converter station. Direct impacts to geologic resources and soils within the proposed corridor could include localized increases in potential for erosion from wind and water runoff, compaction, and rutting.

Areas that are cleared or disturbed by construction could be susceptible to erosion. The impacts from erosion are a function of the local soil type and land slope and the amount of clearing required. The proposed site of the converter station and associated access road are located in a relatively flat area. Relatively large portions of the proposed transmission line corridor, however, are located in areas with steep slopes and drainages. The potential for soil erosion and resulting sedimentation of downgradient wetlands, drainages, and streams is higher in these steeper areas. Reduced absorption caused when heavy construction equipment compacts the soils can also aggravate erosion. However, outside the location of the converter station site, impacts from construction of the transmission lines would be limited to pole tower sites since vegetation within the remainder of the proposed corridor would not be cleared or disturbed. No significant impacts related to the increase in potential for erosion are therefore expected as a result of construction of the transmission line. Areas that are disturbed by construction equipment are expected to recover with native vegetation after the construction equipment is permanently removed.

5.9 COASTAL AREAS

A discussion of coastal areas is not applicable to this project because the area is not located near coastal areas.

5.10 AIR QUALITY

The proposed project would have an insignificant effect on air quality. Construction of the utility line and converter station would result in short-term emissions from operation of vehicles (tailpipe emissions) and generation of fugitive dust. These construction-related emissions would have minor short-term indirect and direct impacts on air quality. These impacts would be restricted to short periods of construction along the proposed utility line corridor and would diminish after construction ceases. Air quality permits would not be required for construction.

Emissions of nitrogen oxides (NO_x), VOCs, CO, and SO_2 during construction would occur from the tailpipe of internal-combustion engines in a small dozer, a tractor, backhoes, a maintainer, fuel and maintenance trucks, four drilling rigs, a hydraulic lift truck, and from construction worker vehicles and supply trucks traveling to and from the work site.

Potential fugitive dust emissions (PM_{10} emissions) involve (1) land disturbance emissions from construction of the utility lines and converter station, and (2) tailpipe emissions from construction vehicles. During construction, fugitive dust might be generated from soil disturbed during clearing, grading, trenching, backfilling, and movement of construction vehicles along the transmission line. Fugitive dust would also be generated by wind erosion of the disturbed dirt areas before vegetation is re-established.

Construction would have no significant long-term direct, indirect, or cumulative impacts on air quality along the utility line corridor. Monitored background values for PM_{10} concentrations near the construction corridor do not currently exceed NAAQS, and short-term construction activities would not cause these background values to exceed NAAQS in the future. Because construction would not measurably increase background values, the cumulative effect on air quality from construction would be negligible.

5.11 WATER QUALITY/RESOURCES

This section addresses the effects of the proposed project on surface water and groundwater resources. The indirect, direct, and cumulative effects of construction are discussed in the following sections.

5.11.1 Surface Water Resources

Impacts to surface water from the proposed project would be insignificant. Surface water resources present within the proposed project corridor include Dry Creek and Rapid Creek, as well as various irrigation canals, impounded stock ponds in pastureland, and ephemeral streams and drainages. All water bodies and associated buffer zones that would be crossed by the transmission alignment are less than 100 feet wide. As a result, the typical constructed pole interval of 750 feet anticipated for the proposed transmission line would enable all water bodies and buffer zones along the alignment of the transmission line to be physically spanned.

Direct, temporary impacts to the quality of water in Rapid Creek, Dry Creek, and other small water bodies that would be spanned by the transmission line are anticipated to be minor. These impacts could result from movement of construction equipment and could include increased total suspended solids and sediment. Construction near the streams could also disturb adjacent vegetation, increasing the potential for erosion. Vehicle crossings of streams are not anticipated, but if required, could disturb bottom sediments and stream banks, contributing to increased levels of sediment in the water. Bank stabilization and channelization may be required if vehicle crossings should be required. Finally, fuel, solvents, or other hazardous materials could spill during construction near surface water bodies and could introduce contaminants into the water.

Construction would be conducted in accordance with a plan for control of sediment and erosion. The plan would be included with a water quality protection permit application to be submitted under Section 401 of the Clean Water Act. After construction, no direct, indirect, or cumulative impacts to surface water quality that would result from the proposed transmission line are anticipated.

5.11.2 Groundwater Resources

No significant direct, indirect, or cumulative impacts to groundwater quality from the proposed transmission line are anticipated. Some invasive activities would be required to install power poles and towers to sufficient depth. However, placement of the proposed poles and towers would penetrate a maximum of only 10 to 40 feet into the ground. No aquifers are known to be present at the shallow depths required for installation of poles. As a result, the proposed project is not considered likely to impair groundwater resources or quality. The primary aquifer used as a source of water in the region of the proposed transmission line is a Lower Cretaceous sandstone unit, present at a depth of more than

1,000 feet below ground surface. Some minor shallow aquifers and perched groundwater may be present along the alignment of the transmission line. Potential effects to groundwater quality associated with installation of power poles and towers in such areas are expected to be localized and related to soil disturbance from drilling. No lasting impacts to groundwater quality are expected to occur from construction of the transmission line.

5.12 AESTHETICS

The proposed project would have an insignificant effect on aesthetic resources. The project area is characterized by rolling rangelands with a view of the Black Hills west of the project corridor. The view is similar throughout the project area. No scenic viewpoints or scenic roads are in the proposed project corridor. The addition of power lines to the area would have minimal direct or indirect impacts on the already linear features of the landscape, as existing roads, fencing, and power lines transect the area. Construction would temporarily alter the area. Construction equipment, signs, traffic, smoke, and raw earth would temporarily affect the view for residences and highway commuters.

The proposed converter station would have minimal direct or indirect impacts on the aesthetics of the area. The converter station would be located in a valley with neighboring hills in an industrial and ranching area. An auto salvage yard is west of the proposed converter station, and located farther west is a landfill.

Construction would be visible during the project from minor roads in the area. Construction equipment and raw earth would be visible and would create a temporary effect during construction. Construction would be visible to traffic traveling to and from the airport, creating a temporary effect on the view of the city.

Development of land in the region would continue to have cumulative impacts by changing the viewscape from cropland and rangeland to rural and urban developments. Recent developments such as highway development, roads, an auto salvage yard, landfill, substations, and power lines add to the permanent linear change in the landscape.

5.13 TRANSPORTATION

No significant direct, indirect, or cumulative impacts are expected to the transportation systems of cities, counties, and the state. Short-term impacts may include minor traffic delays caused when wires are

strung across roadways or rail lines. Any such short-term roadway or railway closings would be scheduled with appropriate authorities and clearly marked, and detour routes would be provided as necessary. Construction of the proposed project would be expected to cause only insignificant adverse transportation effects to public access as a result of roadway congestion from worker's vehicles.

5.14 NOISE AND RADIO AND TELEVISION INTERFERENCE

This section presents the potential for noise and radio and television interference as a result of the proposed project.

5.14.1 Noise

Potential noise-related impacts from the operation of the proposed transmission line were calculated by Burns & McDonnell as part of an Electrical Effects Analysis report (Burns & McDonnell 2001. According to calculations by Burns & McDonnell, audible noise associated with the proposed transmission line is unlikely to cause annoyance even during precipitation events.

Noise associated with construction of the proposed transmission line and converter station and removal of existing structures and power lines would be intermittent and of relatively short duration. Construction at each pole location would typically occur up to 1 day at a time by different crews at several different times. All construction noise levels would conform to local ordinances. Direct impacts from noise cr ated during construction of the proposed project would be a temporary nuisance to nearby residents and passers-by. Noise created during construction of the project may also prevent wildlife from nearing the construction area. Indirect impacts are not anticipated for the project. Cumulative impacts associated with noise generated by construction and operation of the project are primarily associated with noise from increased conversion of the region from a rural to more suburban area.

After construction is complete, energized transmission lines may emit audible noise as a low hum, crackle, or hissing at certain times as a result of the corona effect, which is common for transmission lines during rain or high humidity. Based on the distance of most local residences from the proposed transmission line, audible noise is expected to be very low or nonexistent. A possible exception are two residences on Lamb Road located within 300 feet of the proposed transmission line; however, the proposed alignment near these residences is already occupied by transmission lines that would be relocated to taller poles during the proposed project. Voltage in each of the existing lines along Lamb

Road is 69 kV, which would increase to 230 kV with implementation of the proposed project. However, additional impacts from noise are not expected to be significant.

The majority of the proposed project is located in rural, unpopulated areas. In addition, direct and indirect impacts from noise associated with construction and operation of the proposed project would be small compared with vehicles on nearby highways and other roadways, the Rapid City Regional Airport, and farm equipment. In addition, the proposed project is not expected to contribute significantly to cumulative noise impacts within the project corridor.

5.14.2 Radio and Television Interference

Interference with radio and television signals could occur in vehicles driving in the vicinity of, or homes located near, the transmission lines. However, interference is expected to be limited since radio and television interference generally occurs in older transmission lines with loose or dirty insulators and spark gaps.

Potential radio and television signal interference-related impacts were calculated by Burns & McDonnell as part of an Electrical Effects Analysis report (Burns & McDonnell 2001). According to calculations by Burns & McDonnell, the proposed 230 kV transmission line may produce some AM radio interference within 150 feet of the centerline. These calculations suggest that the proposed transmission line should not produce objectionable levels of television signal interference. Basin Electric's policy is to investigate and correct problems with television and radio interference associated with its lines.

5.15 HUMAN HEALTH AND SAFETY

The proposed transmission line would be constructed to NESC standards and, as a result, would not present significant direct, indirect, or cumulative impacts posed by safety or electrical hazard to the general public. Potential shock hazards may result from objects such as antennas and irrigation equipment that impedes the transmission line ROW. General operation of the transmission line would not present a safety or electric hazard to the general public since Basin Electric's standard grounding policies effectively mitigate the possibility of nuisance shocks caused by induced currents from stationary objects.

Operation of the transmission line would result in increased EMF levels in the area adjacent to the transmission line. However, numerous sources of EMF exist in nature and in the occupational and

residential environments and, in nearly all instances, pose no obvious threat to human health or safety. Certain epidemiological investigations have suggested potential risks to residential and occupational populations from exposure to EMF. However, many studies report no statistically significant correlation. A recent Danish residential study reported that while consumption of electricity in Denmark has increased by 30 times since 1945, incidence rates of cancer had changed little (Guenel and others 1993). In October 1996, NRC completed a study of research on EMF that had been ongoing since 1979 and concluded that the evidence so far "does not show that exposure to these fields presents a human health hazard" (NRC 1996). Laboratory studies have also been predominantly inconclusive. Because the majority of the proposed alignment would be located in rural, undeveloped areas, the potential for effects is further diminished and direct, indirect, and cumulative impacts are not anticipated to be significant.

A new converter station would operate along with the proposed transmission line. Operation of the converter station would present a potential safety and electric hazard to the general public because of the high voltage that passes through the converter station. The hazard would be effectively mitigated by construction of a fence with warning signs posted at appropriate intervals surrounding the converter station.

Other potential safety hazards include air travel safety and safety to sensitive facilities, such as schools. The proposed transmission line does not impede Rapid City Regional Airport air space. If required by FAA, marker balls would be installed at appropriate intervals along the transmission line. No impacts should occur to existing schools, health facilities, or hazardous materials sites during operation of the pr ject.

5.16 SOCIOECONOMIC AND COMMUNITY RESOURCES

This section evaluates the potential impacts of the proposed project in the context of social and economic changes in the study area. The impacts to socioeconomic and community resources from the proposed project would be insignificant.

5.16.1 Population

The proposed project would have an insignificant effect on population resources. The construction period for the proposed project is estimated at 6 to 12 months. Approximately 30 to 60 workers would be required throughout this construction period. It is not anticipated that the population of Pennington

County and the greater Rapid City metropolitan area would be affected, as the number of workers required for installation of the proposed transmission line would be relatively small. It is expected that a portion of the construction work force will be native to the Rapid City metropolitan area.

5.16.2 Economic Conditions

The proposed project would have an insignificant impact on economic conditions. The estimated labor cost for contract construction in 2001 dollars is $10 million to $12 million. The labor costs would be spread over the 1-year construction period and includes salaries, benefits, and overtime for contract supervisors, skilled and unskilled labor, and rental of trade equipment. The average monthly payroll is estimated at $1 million per month. The majority of this total income would be spent in the area and would result in increased sales tax receipts throughout the area. Assuming that 75 percent of these wages and salaries represent disposable income, and that the local spending capture rate is 20 percent for non-local construction workers, a total of $1 million to $2 million in local spending for goods and services would be expected as a result of the proposed transmission line project.

In addition to local expenditures by construction workers, other income generated by construction of the transmission line would include local purchases of materials. It is likely that Basin Electric would acquire a variety of construction materials and supplies within the greater Rapid City metropolitan area. These materials could include fencing, concrete, tools, fuels, and a variety of other construction-related materials. Local suppliers of these materials could expect increases in sales during the construction period. Because a local work force would be used for construction of the proposed transmission line, the impact on housing would be negligible.

5.16.3 Environmental Justice

The proposed project would not have an impact on environmental justice. Pursuant to Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, the proposed action has been evaluated to assess whether it would result in any disproportionately high and adverse human health or environmental effects on minority and low-income populations. The proposed action would not disproportionately affect any communities, including those of minority or low-income groups. No burdens would be imposed on any community resources, nor would any adverse health conditions be created by the proposed action. As a result, there are no adverse impacts on minority or low-income populations.

The percentage of minorities in Pennington County and the greater Rapid City metropolitan area is higher than in the state of South Dakota as a whole (see Section 4.16.3). In addition, in 1997, the median household income was higher in Pennington County than in South Dakota as a whole (Census 2001). Construction of the project would not present a disproportionate impact to human health or the environment on minorities or low-income populations in Pennington County. In addition, no additional burdens would be imposed on local minority or low-income services as a result of the proposed transmission line.

5.16.4 Local Facilities, Services, and Utilities

A portion of the work force proposed for construction of the project would be local; therefore, there should be no additional demand on local services such as police, medical facilities, fire, or educational services and there should be no detrimental impact to the community. No significant impact on the existing infrastructure would occur.

6.0 MITIGATION AND MONITORING

This section describes, where possible, specific mitigation measures and monitoring commitments that would be implemented to avoid or minimize the impacts of the proposed project or that are required by federal, state, or local permits or approvals.

6.1 LAND USE

The proposed project corridor crosses mainly private land that is zoned agricultural and is regulated by Pennington County land use plans and ordinances, as described in Section 4.1. Following are specific measures that would be adopted to protect land use in the proposed project corridor:

- A commitment to follow the recommendations of the district conservationist to minimize soil erosion.
- Minimal closure of access to livestock and farm irrigation, tilling, and harvesting operations to minimize local occupational disruption.

6.2 FLOODPLAINS

The proposed transmission system would be designed and constructed in accordance with all federal, state, and local requirements, including any outlined in the Pennington County Flood Damage Prevention Ordinance. Information would be submitted to Pennington County as required by the flood damage prevention ordinance to demonstrate that the transmission system would meet the criteria specified in the ordinance, to describe any potential alteration in flood watercourses and, if an alteration in a water course is anticipated, to certify that the flood-carrying capacity of the watercourse would not be diminished. Floodplain development permits and any other applicable state, local, or federal permits would be obtained before construction begins.

Concerns related to erosion or other physical impacts to floodplains in the event of a flood would be addressed through engineered controls, which may include use of riprap in areas such as channel banks that are prone to erosion. Design of the transmission system would minimize any individual or combined impact caused by the presence of the power poles. Hydraulic analysis of affected areas would be conducted to verify that the poles are properly installed and anchored, and design drawings and specifications for installation and anchoring would be reviewed by a registered professional engineer and would be certified as adequate to withstand forces associated with a 100-year flood.

6.3 WETLANDS

The proposed project corridor crosses, or is located near, several wetland areas, as described in Section 4.3. Small wetland areas within pastures along the diagonal portion of the proposed alignment may be crossed during construction and maintenance if appropriate alternate access routes along the proposed transmission lines are not identified. These crossings, if necessary, would be designed to minimize direct and indirect impacts to wetland functions, as described below.

- Designs would include sloping the banks of wetlands and placement of geotextile or rock (or both) in the wetlands to stabilize the beds and banks.
- All adjacent upland areas disturbed by construction or maintenance would be surrounded by silt fences and staked hay bales, as appropriate, to minimize indirect impacts to wetlands caused by siltation or sedimentation.
- Staging and laydown yards for project-related construction would be established at least 50 feet from waterways or wetlands, if permitted by topography. No vegetation would be cleared between the yard and the waterway or wetland.
- Construction equipment would not be serviced within 25 feet of waterways or wetlands. Equipment would not be fueled within 100 feet of the waterways or wetlands.
- Any spills of fuels or other hazardous materials during construction or system maintenance would be promptly contained and cleaned up to the extent possible.
- Any herbicides used in ROW maintenance would be approved by EPA and applied by licensed professionals. Application of herbicides would be limited to the extent necessary for regular maintenance of the transmission system.
- Best management practices would be implemented to minimize erosion and sedimentation, runoff, and surface instability during construction.

6.4 CULTURAL RESOURCES

The proposed project corridor contains five sites and several ditches that would be considered eligible for inclusion on the NRHP. These sites would not require mitigation as long as construction would not disturb the aboriginal stone cairns.

6.5 THREATENED AND ENDANGERED SPECIES

No specific mitigation measures are applicable to this section, as the proposed project would not pose disproportionate environmental effects to threatened and endangered species.

6.6 FISH AND WILDLIFE RESOURCES

Preventive action may be implemented to protect against and reduce raptor collisions with and electrocutions by power lines. The effects of electrocution can be decreased by mitigation. Raptor collisions and electrocution may be minimized by implementing precautions such as installation of jumpers, bushing covers, and pole top configurations or other mitigation measures approved by power generating associations, such as the Electric Power Research Institute (EPRI), which has issued detailed procedures for mitigation (Tetra Tech 2001e).

Vegetation would be replanted to limit displacement of wildlife. Trees removed during construction of the power line should be replaced by planting nearby. Grasses would be reseeded, and shrubs should be replaced with container-grown plants.

6.7 VEGETATION

Construction would be sequenced to limit disruption to any area at one time to reduce the impact of construction on vegetation. After construction is complete, any compacted soil would be tilled and the area would be reseeded with native grasses and forbs. Because of their slower growth and establishment, shrubs would be replaced with container-grown plants to decrease time for establishment. Trees removed during construction would be replaced.

6.8 GEOLOGICAL RESOURCES

Erosion of soil at pole tower sites, the proposed converter station, and access roads required for construction and maintenance of the project would be managed through implementation of a county- or state-approved soil erosion and sediment control plan until vegetation is re-established naturally or through seeding.

The following practices would be adopted for construction of the transmission line, converter station, and any access roads to minimize impacts to geologic and soil resources.

- The amount of land cleared at any time would be limited to the amount required to maintain construction sequence and schedule.
- Natural ground cover as possible would be retained to the extent possible.

- Any topsoil removed during construction would be stockpiled for use during reclamation.
- Disturbed areas would be reclaimed as soon as practicable after construction ends in those areas.
- Areas where cover is removed would be seeded with native plant species.
- Reasonable steps would be taken to ensure that any fill material used during construction is free of contaminants.

6.9 COASTAL AREAS

A discussion of coastal areas is not applicable to this project because the area is located well beyond any coastal areas.

6.10 AIR QUALITY

Particulate emissions associated with construction of the utility line and converter station would be mitigated using dust-suppression techniques. Examples of measures for control of particulates are, if necessary:

- Applying water or dust palliatives, such as magnesium chloride, to disturbed areas, as necessary, to reduce dust when vehicle traffic is present.
- Covering open haul trucks with tarps both on site and off site.
- Ensuring that construction vehicles use paved roads wherever possible to access the construction ROW.
- Limiting vehicle speeds on unpaved roads and in the construction ROW, as required, to control dust.
- Removing any soil or mud deposited by construction equipment on paved roads near the egress from unpaved areas, when required.
- Stabilizing disturbed areas in compliance with the revegetation plan after construction is complete.

With implementation of these mitigation measures, PM_{10} emissions from construction would be substantially reduced. Accordingly, PM_{10} emissions from the project, as mitigated, are considered less than significant.

6.11 WATER QUALITY/RESOURCES

Construction of the proposed transmission line would comply with all applicable federal, state, and local permits required for alteration of wetlands, streams, or rivers that results from the project. The following are specific measures that would be adopted to protect water quality in the proposed project corridor:

- Best management practices would be implemented to minimize erosion and sedimentation, runoff, and surface instability during construction.
- Construction would be conducted to minimize disturbances around surface water bodies to the extent possible.
- Current drainage patterns in areas affected by construction would be maintained to the extent possible.
- Staging areas for project-related construction equipment would be located in areas that are not environmentally sensitive to control erosion.
- Any work in existing streams would be conducted, to the extent possible, during low flow periods or when the streams are dry.
- If stream crossings are required, temporary bridges would be constructed at as close to a right angle with the stream as possible. After construction, all temporary construction crossings would be removed and the area would be restored as nearly as possible to its original condition.
- Staging and laydown yards for project-related construction would be established at least 50 feet from waterways or wetlands, if permitted by topography. No vegetation would be cleared between the yard and the waterway or wetland.
- Construction equipment would not be serviced within 25 feet of waterways or wetlands. Equipment would not be fueled within 100 feet of the waterways or wetlands.
- Any spills of fuels or other hazardous materials during construction or system maintenance would be promptly contained and cleaned up to the extent possible.
- Any herbicides used in ROW maintenance would be approved by EPA and applied by licensed professionals. Application of herbicides would be limited to the extent necessary for regular maintenance of the transmission system.

6.12 AESTHETICS

The power lines are to be located in rural agricultural and ranching areas. The addition of power lines would have minimal impact on the area as existing power lines, fencing, and roads create a linear appearance in the area. Trees and shrubs planted near the substation can conceal it from nearby roads.

Construction debris and equipment would be removed from the view of residences and highways to minimize any temporary aesthetic impacts. Construction trash would be removed daily.

6.13 TRANSPORTATION

Right-of-way surveying and staking, vegetation clearing, construction, operation and maintenance of the proposed transmission line path would comply with all applicable state and local regulations and permit requirements. However, Basin Electric and its contractors would implement the following mitigation measures to avoid or minimize any potential impacts to transportation routes within the study area:

- Construction vehicles would not exceed the posted weight limit of bridges.
- Construction along or across roads and highways would incorporate an appropriate traffic control plan in accordance with the Manual of Uniform Traffic Control Devices.
- Permits would be obtained from the South Dakota Department of Transportation for encroachment across highways.
- No permanent access roads would be installed without securing an agreement from the landowner.
- All ROW access would be from the nearest existing public roadway and would avoid or minimize intrusion into off-site areas. Access to the ROW may also be obtained as stipulated in the individual easement agreements.

6.14 NOISE AND RADIO AND TELEVISION INTERFERENCE

Impacts related to ambient noise and television interference are expected to be negligible based on calculations presented in Burns & McDonnell (2001). According to calculations by Burns & McDonnell, the proposed 230 kV transmission line may produce some AM radio interference within 150 feet of the centerline. These calculations suggest that the proposed transmission line should not produce objectionable levels of television signal interference. Basin Electric's policy is to investigate and correct problems with television and radio interference associated with its lines.

6.15 HUMAN HEALTH AND SAFETY

Construction of the Rapid City Tie Project would comply with all NESC standards to ensure minimal safety and electrical hazards. Following are specific measures that would be taken to protect human health and safety in the proposed project corridor:

7.0 CORRESPONDENCE, PUBLIC NOTICE, AND OTHER PROJECT COORDINATION

As outlined in the Rural Utilities Service (RUS) guidelines for preparation of environmental reports (ERs), applicable federal state, and local government agencies and other potentially concerned parties received letters describing Basin Electric's proposed action and requesting information regarding potential concerns (RUS 2001). Appendix D contains copies of letters and other correspondence between Basin Electric and applicable agencies and parties. Appendix D also contains a copy of the public notice for the Rapid City Tie Project.

- Standard grounding policies would be implemented to minimize the possibility of nuisance shocks caused by induced currents from stationary objects.
- A fence and posted warning signs would be constructed to minimize the possible hazard of the converter station.
- Marker balls would be installed, at appropriate intervals along the transmission line, to prevent air traffic accidents with the lines, if required by the FAA.

6.16 SOCIOECONOMIC AND COMMUNITY RESOURCES

No specific mitigation measures are applicable to this section, as the proposed project does not pose disproportionate environmental effects to minority and low-income populations.

8.0 DOCUMENT PREPARATION AND CONSULTATION

Tetra Tech prepared this ER under contract to Basin Electric. The Tetra Tech Core Team and Technical Specialists who prepared this document are listed in Table 9-1. Other contributors involved in the production of this report include Arvilla Consulting, the subcontractor to Tetra Tech for this ER, and Basin Electric.

TABLE 8-1
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LIST OF PREPARERS FOR ENVIRONMENTAL REPORT

Name	Education and Experience	Responsibility
Tetra Tech Core Team		
Robert Hammer	M.S. Meteorology B.S. Meteorology 19 Years Experience	Project Manager
Randy Fox	M.S. Atmospheric Science B.S. Education 18 Years Experience	Assistant Project Manager
Dennis Haag	Certified Wildlife Biologist B.S. Wildlife Science & Range Science 34 Years Experience	Field Investigation Lead, Data Collection
Butch Fries	M.A. Mass Communication B.A. Journalism 23 Years Experience	Technical Editor
June Diller	33 Years Experience	Word Processing, Document Preparation
Heather Giovagnoni	B.A. Geography 2 Years Experience	Maps, Figures
Tetra Tech Technical Specialists		
Jim Bowlby	B.S. Hydrology 23 Years Experience	Geology
Alan Johns	M.S. Environmental Management B.A. Environmental Studies 5 Years Experience	Floodplains, Soils, Field Investigation, Water Resources
Pam Cornelisse	B.S. Biology 4 Years Experience	Vegetation, Field Investigation
Sharon Scheminske	B.S. Environmental Science 1 Year Experience	Air Quality, Socioeconomics
Jennifer Schwarz	M.S. Environmental Science & Engineering B.A. Geology 8 Years Experience	Land Use, Socioeconomics
Arvilla Consulting		
Jim Haag	M.A. Anthropology B.A. History & Sociology 25 Years Experience	Cultural Resources

TABLE 8-1 (Continued)
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
LIST OF PREPARERS FOR ENVIRONMENTAL REPORT

Name	Education and Experience	Responsibility
Basin Electric Power Cooperative		
Jim Berg	Certified Professional Geologist B.S. Geology 22 Years Experience	Project Description
Gary Christianson	Registered P.E. B.S. Civil Engineering 30 Years Experience	Project Engineer
James R. Miller	Registered P.E. B.S. Electrical Engineering 39 Years Experience	Project Manager

9.0 REFERENCES

Backlund, D. (Resource Biologist for the South Dakota Department of Game, Fish, and Parks). 2001. Search Conducted using the South Dakota Natural Heritage Database for State Threatened and Endangered Species in the Project Corridor. March 26.

Bucher, Willis & Ratliff Corporation (BWRC). 1997. Rapid City Regional Airport Property Map. October 22.

Bureau of Economic Analysis (BEA). 2001. 1997 Per Capita Personal Income. U.S. Department of Commerce. Accessed on March 30, 2001. On-Line Address: http://www.bea.doc.gov/.

Burns & McDonnel. 2001. Rapid City 230 kV Transmission Project, Electrical Effects Analysis. Completed for Basin Electric Power Cooperative. Bismarck, North Dakota. May.

Cattermole, J. Mark. 1972. Geologic Map of the Rapid City East Quadrangle, Pennington County, South Dakota. U.S. Geological Survey, Geologic Quadrangle Map GQ-986. 1:24,000.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Office of Biological Services. Washington, D.C.

Dakota, Minnesota and Eastern Railroad Corporation (DM&E). 2000. "Draft Environmental Impact Statement. Powder River Basin Expansion Project." Prepared for the Surface Transportation Board's Section of Environmental Analysis (SEA). September 27.

DeLorme. 2000. Street Atlas USA. Version 8.0. CD ROM.

Dirks, B., J. Dinan, M. Schwalbach, C. Kruse, K.F. Higgins, N. McPhillips, E. Dowds, and G. Vandel. 1993. Surveys of size distribution and fledgling production of piping plover and interior lest tern populations along rivers in South Dakota, 1978-1991. Pages 60-61.

Federal Aviation Administration (FAA). 2001a. Sectional Aeronautical Chart. Cheyenne. National Aeronautical Charting Office (NACO). January 25.

FAA. 2001b. United States Government Flight Information Publication. U.S. Terminal Procedures. Volume 1 of 3. NACO. March 22.

Gucnel, P., P. Raskmark, X. Andersen, and E. Lynge. 1993. Incidence of Cancer in Persons with Occupational Exposure to Electromagnetic Fields in Denmark. *British Medical Journal* 50:758-764.

Johnson, James R., and Gary E. Larson. 1999a. Grassland Plants of South Dakota and the Northern Great Plains. South Dakota State University College of Agriculture and Biological Sciences, South Dakota Agricultural Experiment Station, B566 (rev). August.

Johnson, James R., and Gary E. Larson. 1999b. Plants of the Black Hills and Bear Lodge Mountains. South Dakota State University College of Agriculture and Biological Sciences, South Dakota Agricultural Experiment Station, B732. August.

McGregor, Edward E., and Cattermole, J. Mark. 1973. Geologic Map of the Rapid City NW Quadrangle, Meade and Pennington Counties, South Dakota. U.S. Geological Survey, Geologic Quadrangle Map GQ-1093. 1:24,000.

Meeks, William A., and Kenneth F. Higgins. 1998. Nongame birds, small mammals, herptiles, fishes: Sand Lake National Wildlife Refuge, 1995-1996. South Dakota Agricultural Experiment Station Bulletin 729. South Dakota State University, Brookings, South Dakota. 28 pp. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. Accessed on April 16, 2001. On-Line Address: http://www.npwrc.usgs.gov/resource/2000/sandlake/sandlake.htm. (Version 04AUG2000).

National Park Service. No date. Wind Cave checklist of birds. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. Accessed on April 16, 2001. On-Line Address: http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r6/windcave.htm (Version 22MAY98).

National Research Council (NRC). Committee on the Possible Effects of Electromagnetic Fields on Biological Systems. 1996. Possible Health Effects of Exposure to Residential Electric and Magnetic Fields. National Academy Press.

North Dakota Game and Fish Department (ND Game and Fish). 1994. Fishes of the Dakotas. North Dakota Game and Fish Department, Bismarck, ND. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. Accessed on March, 2001. On-Line Address: http://www.npwrc.usgs.gov/resource/othrdata/dakfish/dakfish.htm (Version 16JUL97).

Rapid City Area Economic Development Partnership (RCAEDP). 2001. Accessed on March 28, 2001. On-line Address: http://rapiddevelopment.com/.

Rural Utilities Service (RUS). 2001. Guide for Preparing an Environmental Report for Electric Projects Requiring an Environmental Assessment. Bulletin 1794A-601.

South Dakota Department of Environment and Natural Resources (SDDENR). 2001. "Spills and Releases." Accessed on April 11, 2001. On-Line Address: http://www.state.sd.us/denr/DES/ground/dataspil.htm

South Dakota Department of Game Fish and Parks (SDDGFP). 2001a. Letter from Doug Backlund, Resource Biologist (SDDGFP) to Clark Rein, Environmental Scientist (Tetra Tech) regarding research on threatened and endangered species for the study corridor. March 26.

SDDGFP. 2001b. Threatened and Endangered Species Section. Accessed on April 19, 2001. On-Line Address: http://www.state.sd.us/gfp/.

South Dakota Department of Labor (SDDOL). 2001. Population and other demographics for various years. Accessed on March 28, 2001. On-Line Address: http://www.state.sd.us/dol.htm.

South Dakota Department of Transportation (SDDT). 1991. General Highway Map, West Half of Pennington County, South Dakota. December 28.

SDDT. 1998. Official South Dakota Rail Map. Office of Air, Rail & Transport (OART). November 30.

SDDT. 1999. Current Traffic Flow Map. Office of Data Inventory and Traffic Section (ODITS).

SDDT. 2000. Current Traffic Flow Map. ODITS.

SDDT. 2001. South Dakota Functional Classification (Highway Map). Division of Planning and Engineering (DPE). January 16.

South Dakota Geological Survey (SDGS). 1998. Internet resources. Accessed on April 11, 2001. On-line Address: http://www.sdgs.usd.edu/.

South Dakota Governor's Office of Economic Development (GOED). 2001. Community profiles. Accessed on March 28, 2001. On-line Address: http://www.sdgreatprofits.com

South Dakota Natural Heritage Database (SDNHD). 1998. Search Conducted using the South Dakota Natural Heritage Database for Federal Threatened and Endangered Species in South Dakota.

Strobel, Michael L. and others. 1999. Distribution of Hydrogeologic Units in the Black Hills Area, South Dakota. U.S. Geological Survey, Hydrologic Investigations Atlas HA-743. 1:100,000.

Tetra Tech EM Inc. (Tetra Tech). 2001a. Personal communication between Eugene Waterson, District Conservationalist of South Dakota Natural Resource Conservation Service (NRCS), and Dennis Haag of Tetra Tech EM Inc. February 7.

Tetra Tech. 2001b. Record of telephone conversation regarding fish of Rapid Creek and Dry Creek South Dakota. Between Jack Erickson, Wildlife Specialist, South Dakota Department of Fish and Game and Pam Cornelisse, Chemist, Tetra Tech EM Inc. March 22.

Tetra Tech. 2001c. Based on Tetra Tech site reconnaissance along Rapid City Tie Project Corridor on April 4-6.

Tetra Tech. 2001d. Record of telephone conversation regarding water resources of Rapid City Region, South Dakota. Between John Wagner, Rapid City Waste Department and Alan Johns, Environmental Scientist, Tetra Tech EM Inc. April 11.

Tetra Tech. 2001e. Record of telephone conversation regarding raptor electrocutions and bird collisions with power lines. Between Richard G. Carlton, Manager, Quantitative Ecology Environment Department, Electric Power Research Institute (EPRI) and Pam Cornelisse, Environmental Scientist, Tetra Tech EM Inc. April 17.

U.S. Census Bureau (Census). 2001. Population and other demographics for various years. Accessed on March 28, 2001. On-Line Address: http://www.census.gov/.

U.S. Department of Agriculture (USDA). 1986a. Soil Survey of Custer and Pennington Counties, Prairie Parts, South Dakota. Soil Conservation Service.

USDA. 1986b. Soil Survey of Custer and Pennington Counties, Prairie Parts, South Dakota. Soil Conservation Service.

USDA. 1990. Soil Survey of Custer and Pennington Counties, Black Hills Parts, South Dakota. Prepared by E.H. Ensz. Soil Conservation Service (SCS).

USDA. 2001a. South Dakota Agricultural Statistics Service (SDASS). Site visited April 3, 2001. On-line Address: http://www.nass.usda.gov/sd.

U.S. Fish and Wildlife Service (USFWS). 1998. Black-footed Ferret, Return of a Native. Arizona Game and Fish Department. Pierre, South Dakota.

USFWS. 2001. Listings by State and Territory. Threatened and Endangered Species Section (TESS). Accessed on April 19, 2001. On-Line Address: http://ecos.fws.gov/webpage/webpage_usa_lists.html - SD.

U.S. Geological Survey (USGS). 2001. Online Stream Flow Database. Rapid Creek. Accessed on April 11, 2001. On-line Address: http://sd.water.usgs.gov/rt-cgi/gen_tbl_pg.

USGS. 1996. National Seismic Shaking Hazard [online]. Accessed on April 11, 2001. On-line Address: http://geohazards.cr.usgs.gov/eq/index.html.

USGS. 1953a. 7.5-Minute Series Topographic Map of Box Elder, South Dakota. Photorevised 1971. Photoinspected 1978.

USGS. 1953b. 7.5-Minute Series Topographic Map of New Underwood, South Dakota. Photorevised 1971.

USGS. 1953c. 7.5-Minute Series Topographic Map of New Underwood Southwest, South Dakota. Photorevised 1971.

USGS. 1953d. 7.5-Minute Series Topographic Map of Rapid City East, South Dakota. Photorevised 1978.

Van Bruggen, Theodore. The Vascular Plants of South Dakota, second edition. Iowa State University Press. 1985.

Wetland Training Institute, Inc (WTI). 1995. Field Guide for Wetland Delineation: 1987 Corps of Engineers Manual. Poolesville, Maryland. WTI 95-3.

Whitehead, R.L. 1996, Ground Water Atlas of the United States, Segment 8, Montana, North Dakota, South Dakota, Wyoming. U.S. Geological Survey Hydrologic Investigations Atlas HA-730-I.

APPENDIX A

PROJECT PHOTOGRAPHIC LOG

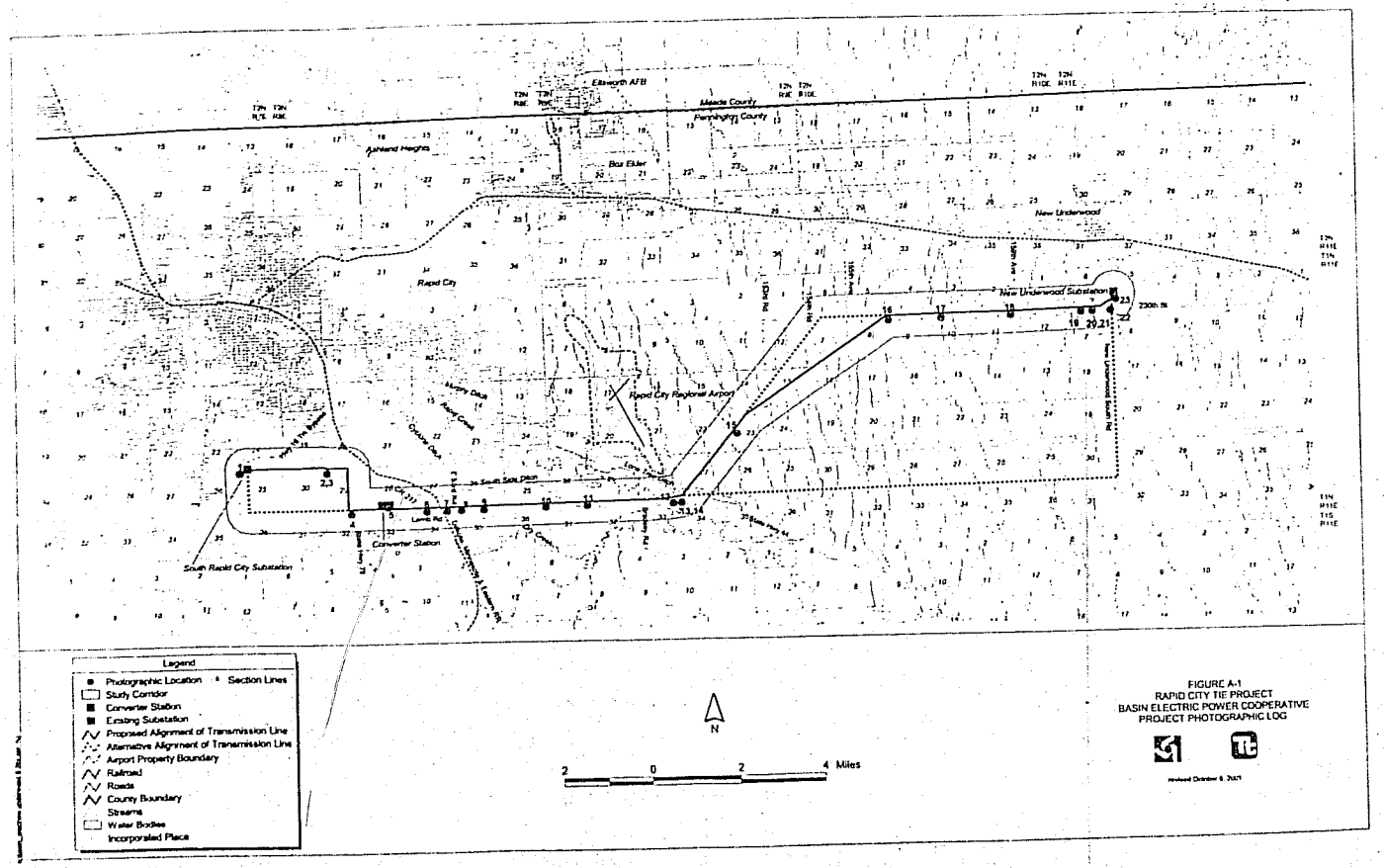
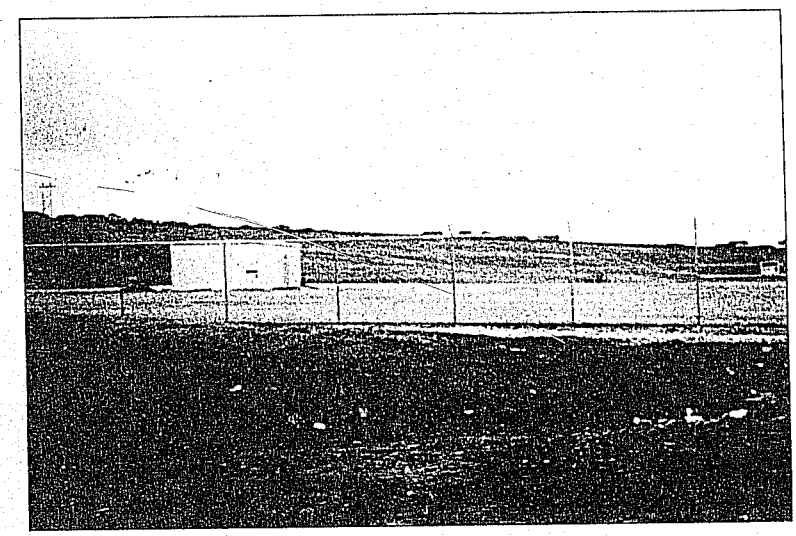
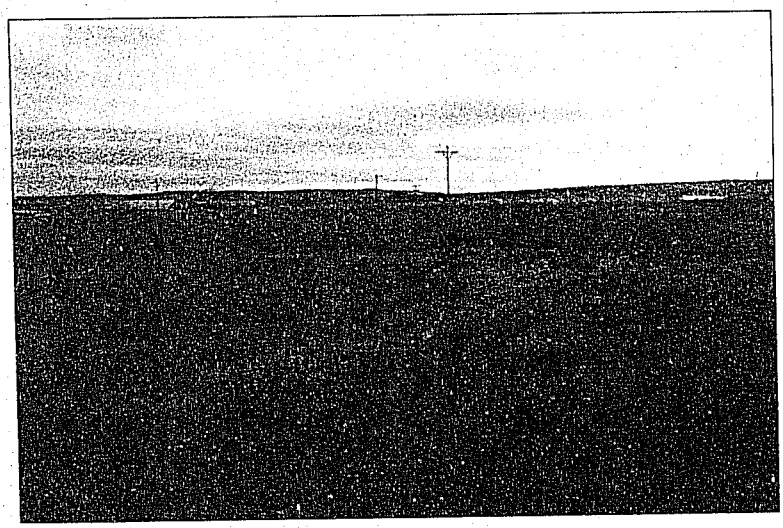


FIGURE A-1
RAPID CITY TIE PROJECT
BASIN ELECTRIC POWER COOPERATIVE
PROJECT PHOTOGRAPHIC LOG

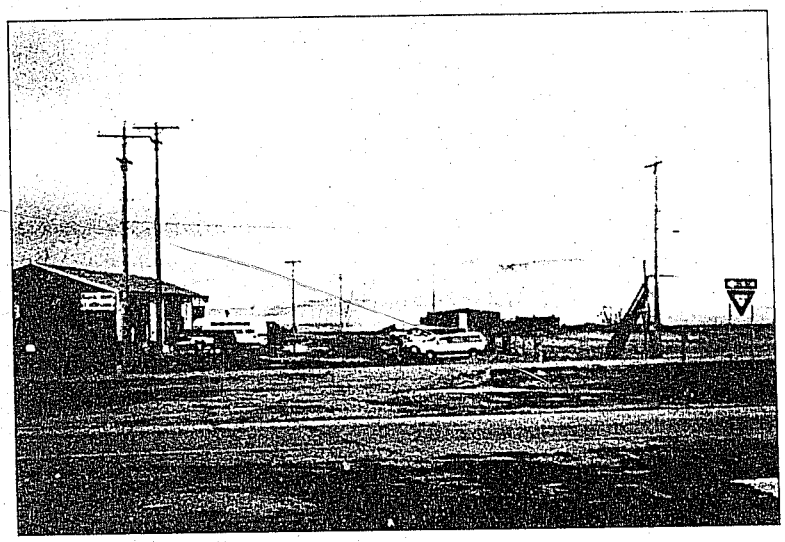
Revised October 6, 2021



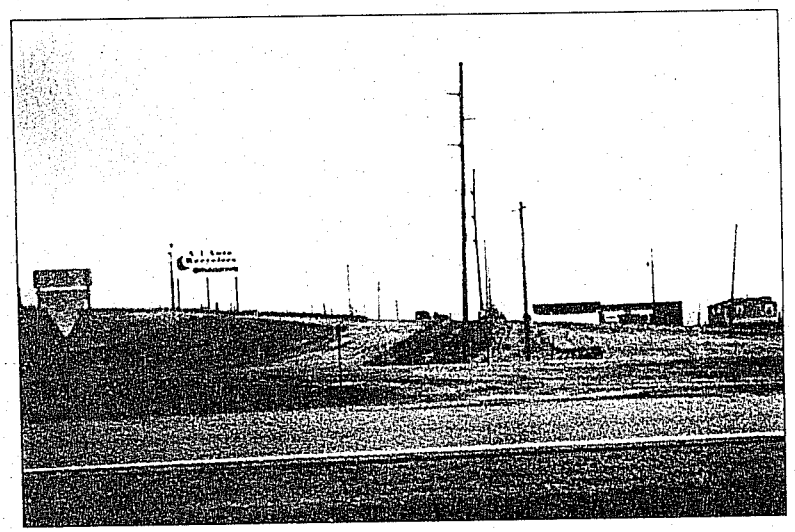
Photograph No. 1 Date: April 5, 2001
Description: Existing west substation.



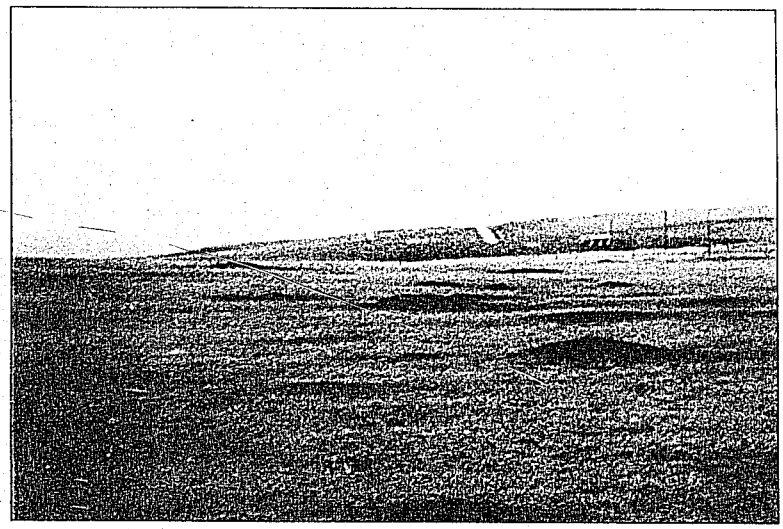
Photograph No. 2 Date: March 28, 2001
Description: Looking northeast at Highway 79 across manmade wetland southeast of city landfill.



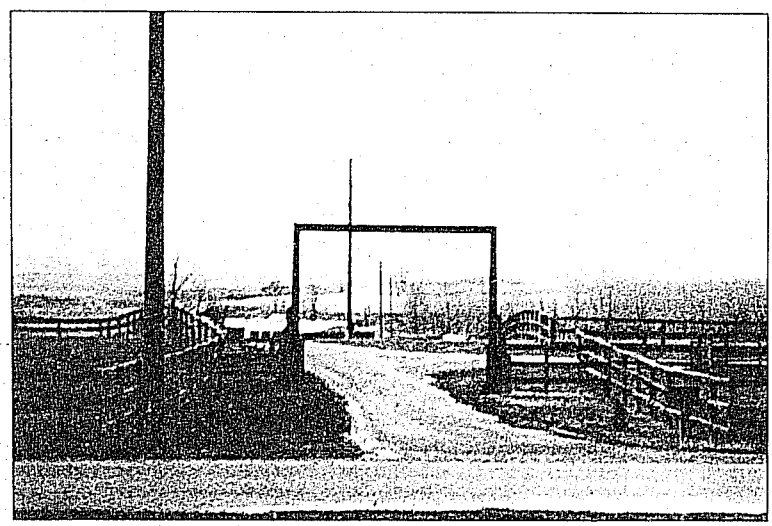
Photograph No. 3 Date: April 5, 2001
Description: Looking east at crossing of Highway 79. Note corral and building that may be relocated.



Photograph No. 4 Date: April 5, 2001
Description: Looking east from Highway 79 crossing for Alternative Route #2 and south turnpoint for preferred route. Note mobile home that may be relocated.

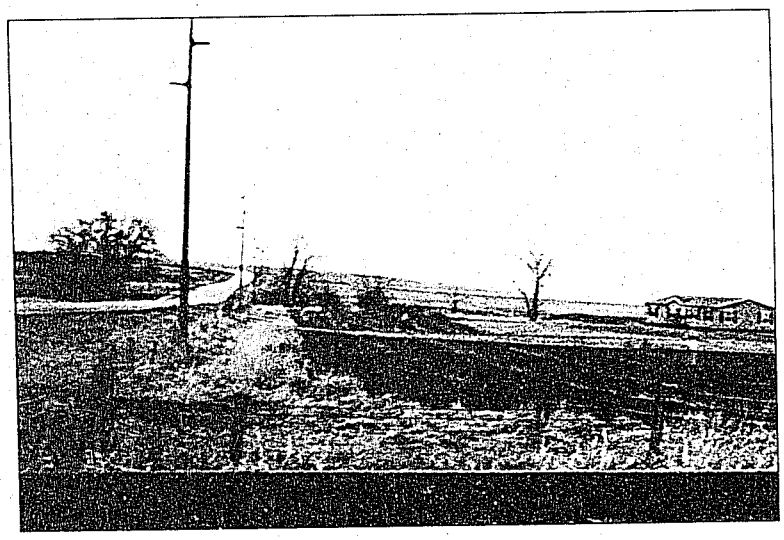


Photograph No. 5 Date: April 5, 2001
Description: Northwest corner of converter station site looking east along north boundary to east boundary with prairie dog colony.

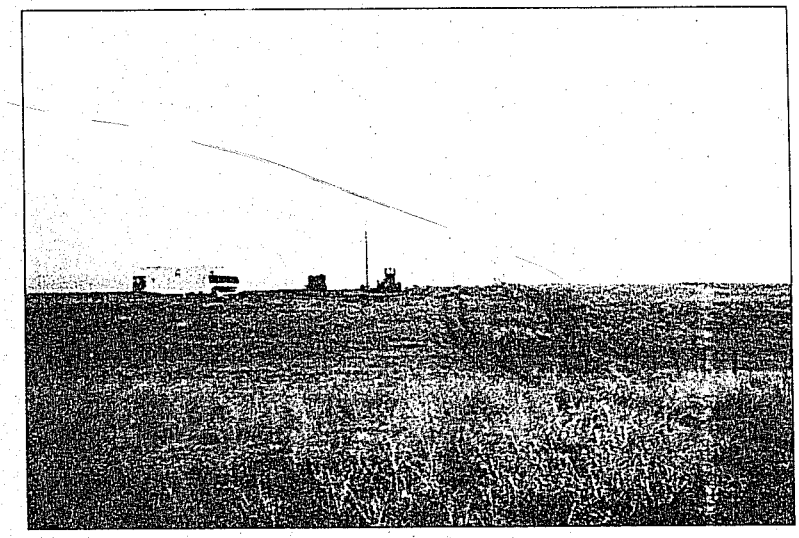


Photograph No. 6 Date: April 5, 2001
Description: Crossing of farm residence entrance drive/gate.

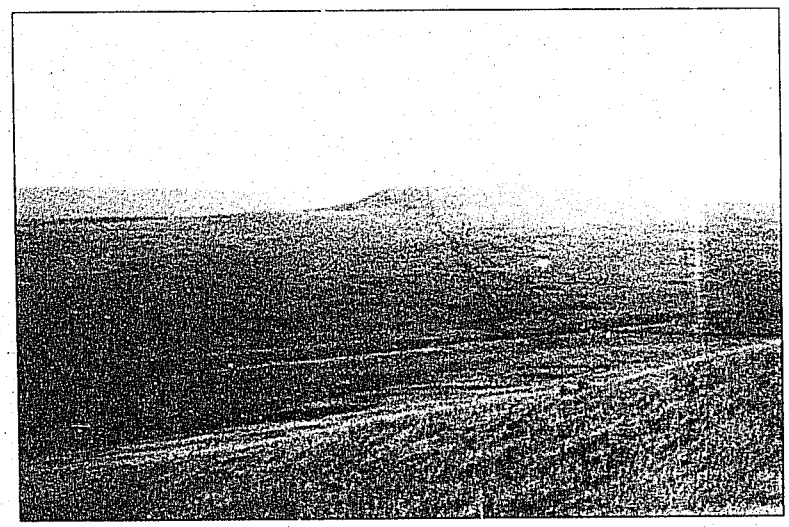
Photograph No. 7 Date: March 28, 2001
Description: Looking north at Dry Creek crossing and Lamb Road.



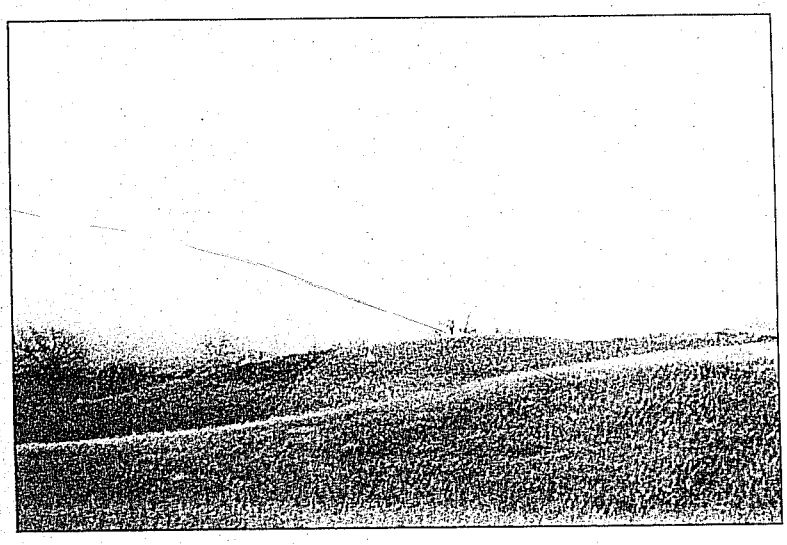
Photograph No. 8 Date: April 5, 2001
Description: Dry Creek floodplain will be crossed at this location.



Photograph No. 9 Date: April 5, 2001
Description: Mobile home.

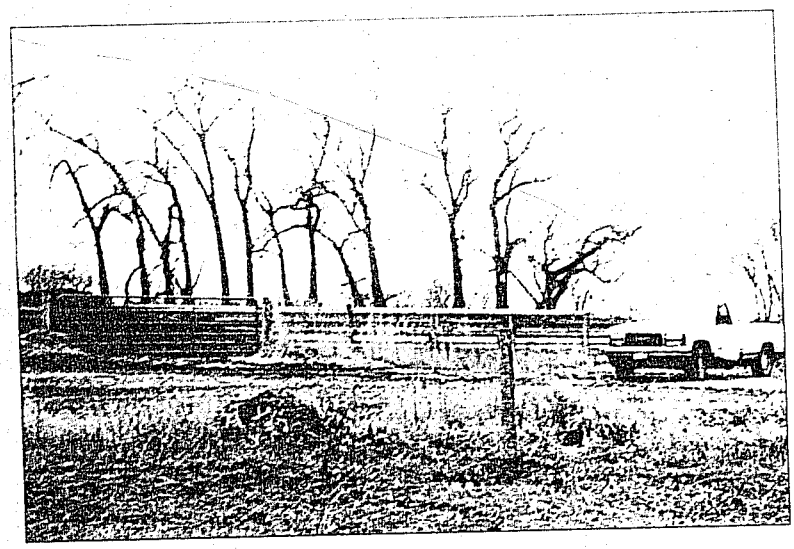


Photograph No. 10 Date: April 5, 2001
Description: Rangeland prairie dog colony.



Photograph No. 11 Date: April 5, 2001
Description: "Breaks" where land rises from irrigation floodplain (in distance).

Photograph No. 12 Date: April 5, 2001
Description: Northeast floodplain looking across irrigated cropland - south arm of oxbow looking at north arm of oxbow and tree-lined feedlot.



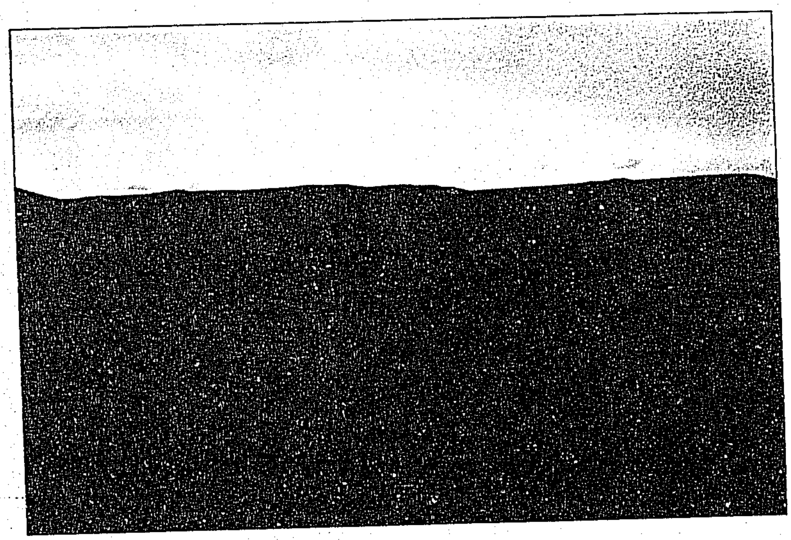
Photograph No. 13
Description: North side of feedlot at centerline crossing.

Date: April 5, 2001

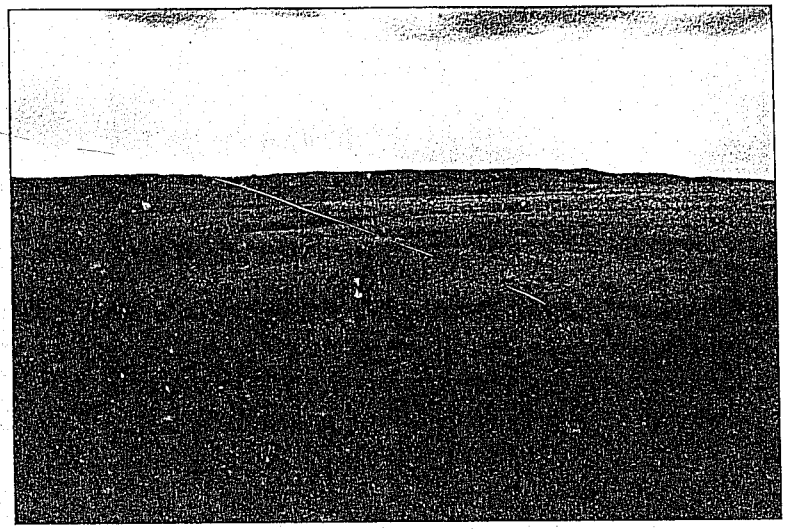
Photograph No. 14
Description: Looking southwest across Rapid Creek oxbow.

Date: March 28, 2001

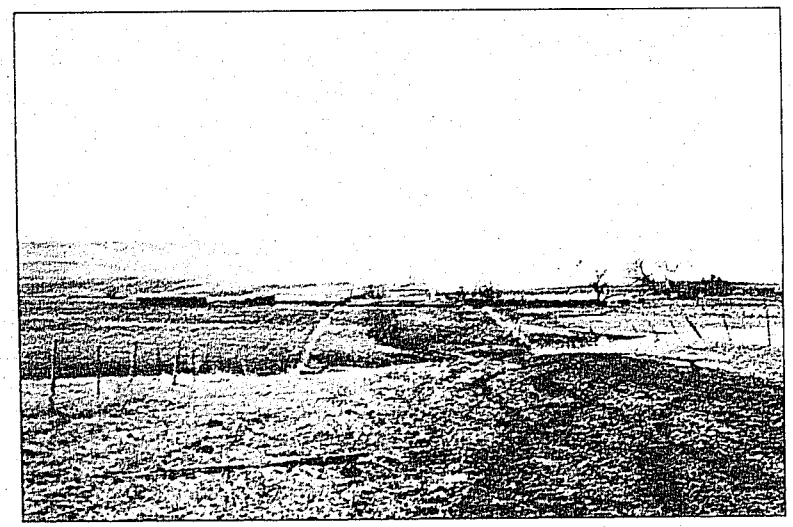
Photograph No. 15 Date: March 29, 2001
Description: Looking southwest at wetland/floodplain along diagonal.



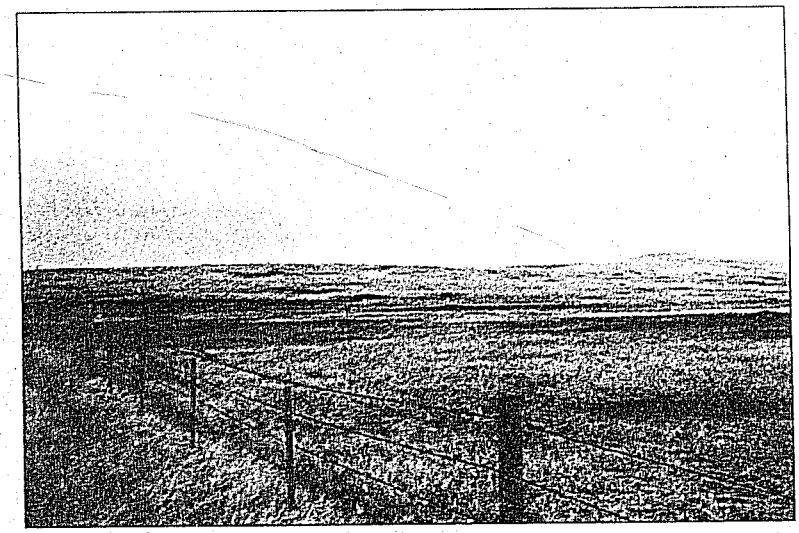
Photograph No. 16 Date: March 29, 2001
Description: Looking southwest from northeastern terminus of diagonal.



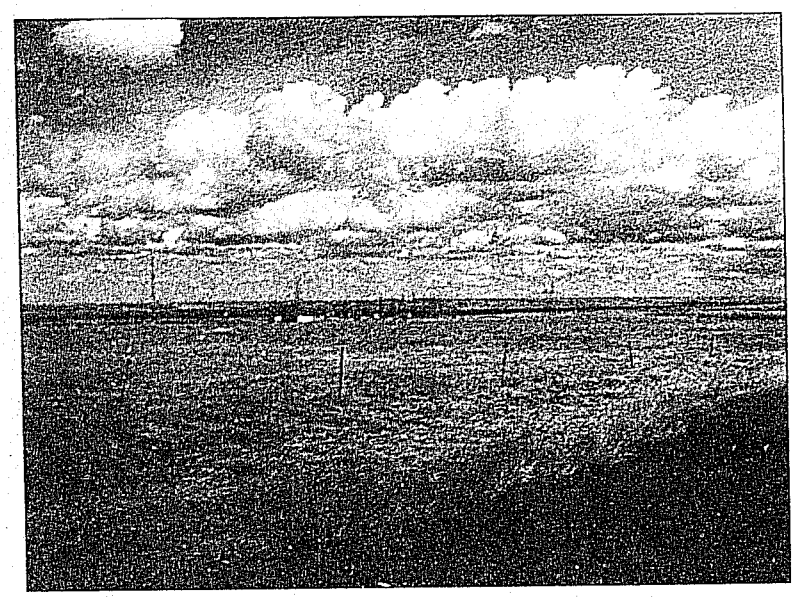
Photograph No. 17 Date: March 29, 2001
Description: Looking south along drainage/wetland located in northeastern portion of study area.



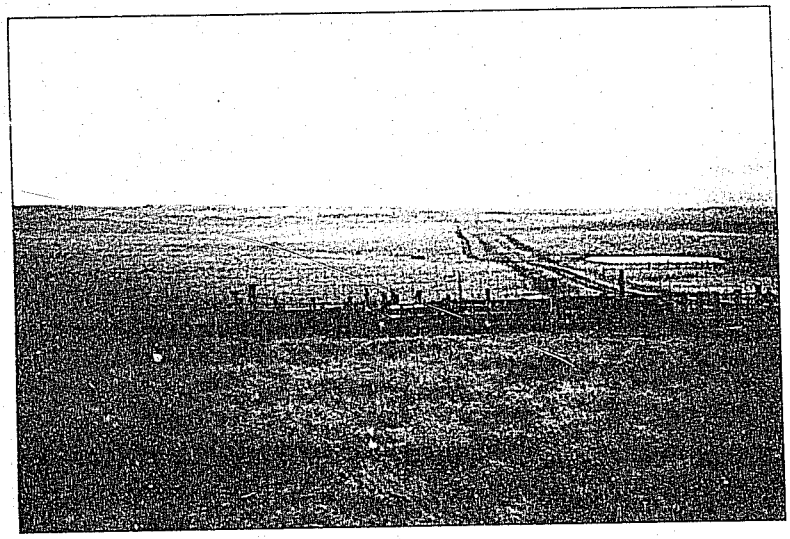
Photograph No. 18 Date: April 4, 2001
Description: Looking west of centerline from Crosbie corrals/feeding area.



Photograph No. 19 Date: April 4, 2001
Description: Prairie dog habitat on well-drained hillside.

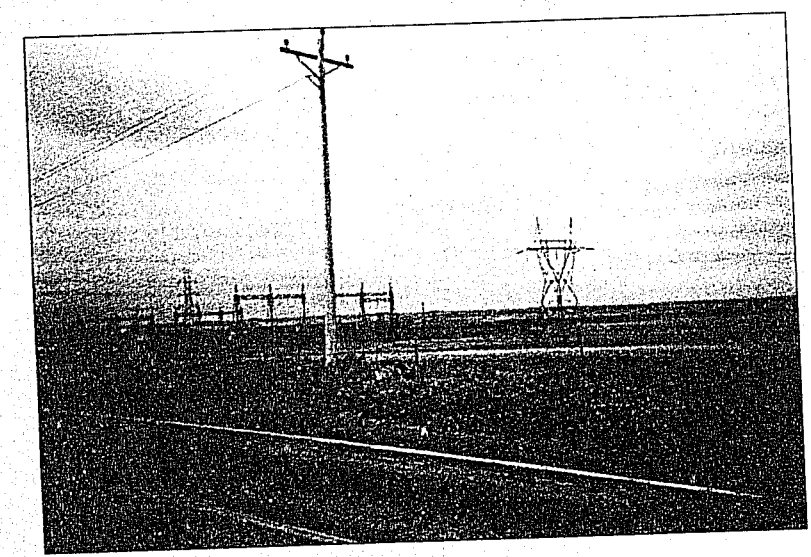


Photograph No. 20 Date: March 29, 2001
Description: Looking northeast at New Underwood substation from project corridor.



Photograph No. 21 Date: April 4, 2001
Description: West – centerline of proposed transmission line route. Corrals from northeast diagonal turning point.

Photograph No. 22 Date: March 29, 2001
Description: Looking west along section line from northeastern portion of project corridor.



Date: April 4, 2001

Photograph No. 23
Description: Road crossing looking at New Underwood Substation.

APPENDIX B

CULTURAL RESOURCES REPORT

CULTURAL RESOURCES REPORT
MAY 2001

A Cultural Resources Inventory of the Basin Electric Rapid City Tie Project, Pennington County, South Dakota

by James K. Haug
Arvilla Consulting

May 2001

James K. Haug, Principal Investigator

Prepared for
Tetra Tech EM, Inc.
4940 Pearl East Circle Ste. 100, Boulder, Colorado 80301
by
Arvilla Consulting
1421 Jupiter Court, Rapid City, S.D. 57701

Abstract

A cultural resources inventory was conducted for Tetra Tech EM, Inc. for the proposed Basin Electric Power Cooperative Rapid City tie project—a power transmission line running from the New Underwood, S.D. substation to a substation situated south of Rapid City, S.D., all in Pennington County. The survey covered 34.7 km (21.6 mi.) plus an 8.1-hectare (20-acre) asynchronous converter station site. Total areal coverage was 122 ha (301 acres).

Three archaeological sites and a historic bridge structure were recorded. Sites 39PN1974 and 39PN1975 are aboriginal cairns. Cairns often have a sacred value to Native Americans, and it is recommended that the project avoid damaging the cairn localities. Site 39PN1976 consists of a leveled area for what had probably once been a ranch outbuilding and a stone-lined well. The site does not appear to meet criteria for inclusion on the National Register of Historic Places. The historic bridge was assigned the number PN-000-00452. It is of the concrete slab variety, but it lacks physical integrity and does not appear to be eligible for the National Register.

The project also crosses the grade of the Chicago, Milwaukee, and St. Paul Railroad (Site 39PN2007) and three historic irrigation ditches—the South Side, Cyclone, and Lone Tree ditches. While all of these are considered eligible for inclusion on the National Register, the individual segments are redundant and have no structures or other features associated with them.

It is recommended that the project receive a No Historic Properties Affected clearance with respect to Section 106 of the National Historic Preservation Act so long as the aboriginal cairns are avoided by construction activities.

Table of Contents

List of Figures

A Cultural Resources Inventory of the Basin Electric Rapid City Tie Project, Pennington County, South Dakota

Project Description

Basin Electric Power Cooperative of Bismarck, ND is planning to construct a power transmission line and asynchronous converter station between the Eastern and Western Power Grids. The line will run from an existing Eastern Power Grid substation at New Underwood, SD to a Western Power Grid substation at Rapid City, SD. A converter station will allow regulated power flow between the two grids. Construction will entail about 23 miles (37 km) of power transmission line and a 20 acre (8 ha) converter station site.

Basin Electric's environmental consultants, Tetra Tech EM, Inc., contracted Arvilla Consulting of Rapid City, S.D. to conduct a record search and on-the-ground cultural resources inventory of the project.

Environmental Setting

The project area runs from the foothills of the Black Hills on the west to the open plains in the east. These areas are characterized by distinct differences in geology, landform, climate, and plant and animal life.

Physiography and Geology

The Black Hills, a literal translation of the Lakota *paha sapa*, have been described as "a forested island in a grassland sea" (Froiland 1978:1). The dark, ponderosa pine-clad slopes stand out in sharp contrast to the surrounding light-colored prairies. The Black Hills are an isolated, mountainous domal uplift rising 900–1,200 m above the surrounding plains. They extend approximately 200 km north-south by 65–80 km east-west. They attain their highest elevation at Harney Peak, 2,203 m above mean sea level. Elevations range from approximately 900–1000 m in the plains to the east (Froiland 1978).

Darton and Paige (1925) described the Black Hills as consisting of four physiographic zones—the Central Area, the Limestone Plateau, the Red Valley, and the Hogback Ridge. These zones are arranged concentrically as a result of weathering of the various overlying geological formations. The outermost zone is the Hogback Ridge, a sandstone ridge that encircles the Black Hills, forming the foothills. The inner slope, facing the Red Valley, is generally steep, while the outer slope is typically more gentle, gradually rising from the plains to the crest. The Hogback is made up of Lower Cretaceous Inyan Kara group sandstones, the Minnewaste limestone, and the Fuson shale.

Outside the Hogback is the Pierre Hills division of the Great Plains (Kalvels 1982:2). The Pierre Hills, occupying the central portion of the Missouri Plateau in South Dakota, reach westward around both sides of the Black Hills uplift into Wyoming and Montana. The area, underlain almost entirely by shales of the Upper Cretaceous Pierre formation, is sometimes call the "gumbo region" because of the sticky clay resulting from the weathering of the shale. The Pierre Hills region consists of smooth rolling hills and ridges.

Climate

The climate of the Black Hills area is highly variable, owing to a combination of semiarid Continental and Mountain types, and it is characterized by warm, dry summers and cold, dry winters. Temperature extremes of 44 degrees and -47 degrees Celsius are documented in the Black Hills area, and the average absolute range in temperature is 60.6 degrees Celsius for the region (Froiland 1978).

Annual precipitation ranges from 355-432 mm on the Plains, while higher elevations in the Hills receive 432–737 mm. Generally, three-fourths of the yearly total falls between April and September. Summer precipitation usually occurs in the form of thundershowers. Winter moisture falls as snow, with heavy snows common during late winter and early spring months. Droughts are frequent, particularly in the southern Black Hills and adjacent Great Plains, and are often severe in nature.

While the climate of the surrounding Plains is generally more severe than that of the Black Hills, it is somewhat ameliorated, particularly to the south and east, by the Hills. Protected from some of the arctic air masses and warmed by frequent chinook winds, the eastern Hills and adjacent Plains enjoy some of the milder winters in the state.

Hydrology

The Black Hills are drained by numerous small streams that radiate outward from the divide formed by the Limestone Plateau. The Belle Fourche River, to the north and east, and the Cheyenne River, to the south and east, nearly encircle the Hills. All streams leaving the uplift eventually flow into one of these two rivers, which join northeast of the Black Hills and flow eastward into the Missouri River. Streams flowing through the project area include Boxelder, Rapid, and Spring Creeks and their tributaries, all of which drain into the Cheyenne River.

Flora and Fauna

The Hogback Ridge is characterized by an open forest of ponderosa pine along the rocky ridges and outcrops, and by American elm and Plains cottonwoods along the drainages. Elm and cottonwoods are also common along the major drainage bottoms. Grassland species on both the Hogback and the plains consist of mixed varieties such as western wheatgrass, blue grama, sideoats grama, needleandthread, big bluestem, little bluestem, and buffalograss. Forbs and shrubs include prickly pear cactus, ball cactus, yucca, sagebrush in the drier areas; American plum, buffaloberry, and wild rose in sheltered areas; and horsetail, cattail, and willow thickets in streamside associations (Froiland 1978).

The Black Hills are home to over 200 vertebrate species (Froiland 1978). Large herbivores native to the area include white-tailed deer, mule deer, pronghorn; bison and elk, once abundant in the region, now thrive under protection after being nearly exterminated by the 1900s. Carnivores include red fox, coyote, lynx, and bobcat. Mountain lions are present, but rare, and an occasional black bear is reported. Gray wolves and grizzly bear were formerly present in the area.

Numerous smaller mammals live in the area: species of bats, chipmunks, squirrels, rats, voles, mice, and gophers, as well as beaver, muskrat, porcupine, raccoon, jack rabbit, yellow-bellied marmot, and black-tailed prairie dog.

More than 100 species of birds are found in the Hills region, notably golden eagle, turkey vulture, ruffed grouse, mallard, sharp-tailed grouse, great horned owl, red-tailed hawk, and

turkey, an introduced species. Also present are other species of raptors, woodpeckers, numerous songbirds, waterfowl, and jays.

Approximately 20 species of amphibians and reptiles, including salamanders, toads, frogs, and turtles, as well as about a dozen species snakes are known to live in the area. The prairie rattlesnake is the only poisonous variety found in the area. Several species of fish, most introduced, inhabit the streams and lakes in the Hills.

Cultural Setting

Several approaches have been used in past decades to organize the cultural history of the region (e.g. Hughes 1949, following McKern 1939; Mulloy 1958). This report utilizes that employed by Frison (1991:20-21). He suggested the use of Paleoindian, Early Plains Archaic, Middle Plains Archaic, Late Plains Archaic, Late Prehistoric, and Protohistoric periods. Organization of cultural entities within each period is rather loosely treated; most often technological horizons are somewhat vaguely structured as complexes. This approach has found fairly widespread acceptance in the region and serves as the general conceptual scheme followed in this report.

Paleoindian Period

This is the earliest period on the northwestern Plains, dating from roughly 10,000 B.C. to about 5500 B.C. (it remains to be seen whether traces of human occupation predating 10,000 B.C. are present on the Northern Plains). It was a period during which the primary adaptive pattern seems to have been a reliance on the hunting of large game animals by small groups of hunters with a highly mobile lifestyle. Several cultural traditions appear to have existed in the region during the period. The earliest is known as the Clovis complex. Its major diagnostic features include the use of Clovis points a selective preference for mammoth hunting. The only excavated Clovis site in the region is the Lange/Ferguson site in the White River Badlands (H_nus 1980, 1982).

Clovis was followed by the Folsom complex from about 8900-8100 B.C. (Frison 1991). The basic pattern seems to have been similar to that of its immediate predecessors. Folsom points replaced the earlier Clovis point type, and now-extinct forms of bison became the major game animals. Folsom occupations are known in the general region from the Hell Gap locality in eastern Wyoming (Irwin-Williams et al. 1973), the Agate Basin locality northwest of Edgemont in eastern Wyoming (Frison 1991), and at the Jim Pitts site west of Custer, S.D. (Donohue 1998). A third complex known as the Goshen-Plainview complex appears at several sites in the northern Plains, including Hell Gap, Milliron and Jim Pitts. Chronologically it appears to fall between and overlap Clovis and Folsom occupations.

Another cultural category represents numerous complexes which have been grouped loosely together under the term *Plano*, which may be dated from approximately 8500 B.C. to 5500 B.C. (Frison 1991). Plano cultural complexes are not well defined; those that have been named are primarily defined by projectile point types. In general, the adaptive strategies of the complexes appear to have become more and more localized over time, with greater dependence on the seasonal availability of resources in various areas. Bison continued to be the major food animal, but deer, elk, antelope and other animals were more commonly hunted. In addition, plant food resources and their preparation seem to have had greater emphasis than in the earlier configurations.

Complexes included in Plano include Agate Basin and Hell Gap (both named for site localities in eastern Wyoming), Alberta, Cody, James Allen, and Angostura—among others. They are numerous and appear to have overlapped somewhat chronologically. Several Plano sites are known from the Black Hills and the surrounding plains

Early Plains Archaic Period

The sixth millennium B.C. marks the onset of a poorly understood climatic period known as the Altithermal, which seems to have led to significant changes in the adaptive strategies employed by the prehistoric peoples of the Plains. Generally, the climate over much of the Plains area became considerably drier than it had been previously (or is today) between 5000 B.C. and 3000 B.C. (Frison 1991)

Projectile points and other artifacts attributable to the Early Plains Archaic are often identified in collections, but well-documented sites are rare. Cultural developments for the period are most notable in the rapid change from the earlier Paleoindian lanceolate projectile points to early side-notched varieties. Bison continued to be hunted, as has been seen at sites such as the Hawken site in northeastern Wyoming (Frison 1991) and the Licking Bison site in northwestern South Dakota (Michael Fosha, personal communication). However, the cultures of the period had also shifted to a more intensive use of the locally and seasonally available resources, including plants and smaller animals; a good example of this type of site is the Beaver Creek rock shelter in Wind Cave National Park (Alex 1991).

Middle Plains Archaic Period

By about 3000 B.C. a new general cultural pattern appeared on the Northern Plains. Some of the new cultures of the period seem to have their antecedent in those of the Early Plains Archaic, but the transition is not well document-ed. These cultures appear to have intensified the adaptive strategy of making exhaustive use of all the resources available in an environment. Technologically, the cultures of the region were remarkably similar throughout the period; they are generally described under the term McKean complex, after the McKean site in the Keyhole Reservoir in Wyoming (Wheeler n.d.).

Sites from this period are very common in the Black Hills and surrounding plains. Dated Sites include the Gant site near Sturgis, S.D. at 2180 B.C. (Hurt 1960), the Kolterman site at Angostura Reservoir at 2280-1700 B.C. (Wheeler n.d.), Hawken II near Sundance, and the George Hey site in the Southern Hills at 1975 B.C. and 1570 B.C. (Tratebas and Vagstad 1979:214-216).

Late Plains Archaic Period

The projectile point styles diagnostic of the Middle Plains Archaic had disappeared by about 1000 B.C. in favor of a corner-notched variety or varieties generally known as Pelican Lake. This point style appears in sites from the period over the entire Northern and Northwestern Plains. Pelican Lake points continued to be present in Plains sites as late as A.D. 800. In the eastern half of South Dakota they are found in assemblages from complexes which made pottery and which erected burial mounds. In the Western Plains, burial mounds are not found, and pottery is associated with very few sites—most of which lie along major drainages. The Pelican Lake complexes appear to have been a continuation of the intensive resource utilization adaptation of the Middle Archaic period, although evidence to show that the seasonal

procurement of bison through organized, large-scale hunts became more important than in the earlier period (cf Reeves 1970:84).

Another Late Plains Archaic complex appeared by about A.D. 100 and lasted until near the end of the period; its major diagnostic is the Besant point (Reeves 1970:91-92). As with Pelican Lake, these appear to overlap with incipient horticultural complexes of the Plains Woodland such as the Sonota Complex of North-Central South Dakota (Neuman 1975). Besant hunters appear to have carried the art of communal bison hunting to an advanced state (cf Frison 1991:105; Reeves 1970).

Late Prehistoric Period

Another complex appeared about A.D. 400. Reeves (1970) defined it as the Avonlea phase and postulated a similar lifestyle to the Besant complexes. Frison (1991) places it in the Late Prehistoric period because evidence suggests that the bow and arrow appear to have come into the Plains through it circa A.D. 600. Several new projectile points are associated with Avonlea; their most notable characteristic is neat side notching near a delicately made base. Their size depends on whether they were dart or arrow points.

After about A.D. 900 there is considerable evidence for occupations by peoples of the major horticultural traditions to the east and south. The major river systems in the area supported numerous horticultural villages after about A.D. 900, a pattern that continued right into the Historic period. These Plains Village cultures made extensive use of the Black Hills region as a resource base, and at least two villages are known or suspected, one near Belle Fourche (39BU2) (Alex 1979) and another (39BU2) near Hermosa. Wheeler (n.d.) reported several sites at Angostura Reservoir bearing ceramics which indicated Plains Village relationships. These include 39FA45 and Component A at 39FA23 (see also Lippincott 1995), which have pottery derived from the Extended variant of the Coalescent tradition on the Middle Missouri, and Component B at 39FA23, which has pottery related to the Initial variant of the Middle Missouri tradition.

Protohistoric Period

With the advent of the sixteenth and seventeenth centuries A.D. the various complexes which inhabited western South Dakota began to take on their presently known ethnic groupings. At some time in the fifteenth century the Plains Village complexes of western Nebraska were displaced for reasons of drought or incursion by nomadic peoples from the west and north (Willey 1966:325-326). Early groups of these newcomers are identifiable as Plains Apache, Kiowa and Comanche (Reher 1977:140-149). About this time the horse was introduced into the region, giving rise to an equestrian hunter-gatherer pattern. Following the Comanche, the Kiowa and Kiowa-Apache inhabited the Black Hills for several decades. They were displaced about A.D. 1750 by the Arapaho and Cheyenne, who were in turn pushed out by the Teton Sioux about A.D. 1770. The latter dominated the Black Hills region until the late nineteenth century, when they were forced onto reservations by the rapidly expanding Euro-American culture.

Historic Period

Information about what was to become South Dakota began to appear on French maps by 1701, but it is not certain that any white explorers had actually reached the region at that time (Schell 1961). The earliest possible recorded sighting of the Black Hills may have been by the

members of the 1743 Verendrye Brothers expedition, but their journal was so poorly kept that it is not definite if this was indeed a sighting of the Black Hills (Cassells et al. 1984).

The fur trade became a profitable business in the Missouri River valley and nearby regions early in the nineteenth century. The fur traders founded many routes going west and gathered much of the earliest information about unexplored areas. The earliest recorded foray by trappers into the Black Hills was in 1823, when a party led by Jedediah Smith entered the Black Hills at Buffalo Gap and passed through the Southern Hills by an unknown route on their way to the Powder River in Wyoming (Cassells, Miller and Miller 1984).

By the middle of the nineteenth century, very little concrete information was known about the Black Hills—despite the fact that trappers had frequented the foothills and drainages, occasional prospectors had penetrated the Hills, and brief reports from several military excursions were available. In 1874 a military expedition led by Lt. Col. George A. Custer explored the Black Hills. A large scientific party accompanied the expedition, gathering biological and geological data. Prospectors accompanying the expedition found gold on French Creek.

The announcement of a gold strike led to the Black Hills Gold Rush. The army initially tried to keep out the miners but failed. By 1876 several mining towns had sprung up and wagon roads led to the Hills from different directions.

The Teton Sioux, or Lakota, resisted the flood of settlers in a brief, bitter war that saw the virtual annihilation of Custer's 7th Cavalry Regiment at the Little Big Horn. Ultimately, however, they were forced by an act of Congress to cede the Black Hills and much of the land designated as the Great Sioux Reservation in the 1868 Fort Laramie Treaty. The Black Hills were officially opened for white settlement in February 1877 (Schell 1961).

As settlement in the Hills increased, so did the need for supplying the mines and miners with food, clothing, and other goods. Several ambitious ex-miners saw the potential for a shipping and refitting terminus on the eastern edge of the Hills. On February 22, 1876 a group of men including John Brennan and 10–12 others set up camp in Rapid Valley, determined to establish a town. They reconnoitered Rapid Creek valley and spent two days laying out a town plat. On February 24 they elected a board of trustees and named the town Rapid City (Miller 1985:15). The population dwindled during the first year, as the war continued with the Lakota. John Brennan estimated that the population fell from more than 200 to about 20 (Miller 1985:16). By the spring of 1877 the war was over and Rapid City became the seat of the newly formed Pennington County. The town quickly became a shipping hub for freight companies sending goods to the Hills.

Supplying fresh food to the mining towns became a priority in short order. Rapid Creek is the largest stream exiting the eastern flank of the Black Hills, and prospective farmers and local boosters quickly saw the possibilities in an irrigation system. As early as January of 1878 plans were afoot for building an irrigation system with the formation of the short-lived Rapid River Ditch and Improvement Company (South Dakota WPA Writers' Project n.d.:entry for March 23, 1878). Over the next few years many local families dug ditches at a rapid pace through cooperative efforts. As time went on, the needs of local irrigators and the construction of federally funded reservoirs upstream led to the formation of a Water Conservancy District to handle irrigation planning (Johnson 1994a:14). The irrigation system is still in use today.

Although there was a limited internal railway system, the Black Hills remained fairly isolated from the rest of the United States. The Fremont, Elkhorn and Missouri Valley Northwestern and

Chicago Railroad reached north from Chadron, Nebraska, and the first train entered Rapid City in July 1886 (Mills 1990:17). It was not until 1907 that direct railroad routes to the east were completed, when the North Western Railroad and the Chicago, Milwaukee, and St. Paul Railroad ended a race to Rapid City in a virtual tie (Mills 1990:55–57).

Farming, ranching, and commerce remained the foundation of the economy of the area for many years, and indeed they are still important. Tourism grew in importance throughout the 20th century and became perhaps the major component of the regional economy. During World War II the Army Air Corps added the final segment to the modern economy with construction of Rapid City Field, later named Ellsworth Air Force Base (Karolevitz 1975:279). The base ultimately became one of the Strategic Air Command's vital bases, hosting strategic missile and bomb wings, and it is now home to a B-1B wing.

Previous Investigations

The record search covered a 1-mile buffer around the proposed project alignment. It included sections 23–26, 35, and 36 in Twp. 1N, Rg. 7E; sections 19–21 and 19–36 in Twp. 1N, Rg. 8E; sections 1, 11–15, and 21–35 in Twp. 1N, Rg. 9E; sections 1–12 and 16–19 in Twp. 1N, Rg. 10E; and sections 4–9, 31, and 32 in Twp. 1N, Rg. 11E.

A total of 16 previous cultural resource inventories have been carried out in the project impact area:

- Buechler (1993a) conducted a survey of the proposed Southwest Connector Highway south of Rapid City. The survey overlapped the record search zone in Section 26, T1N, R7E. No sites or other cultural resources were found
- Alex (1977) surveyed the Highway 16A route just north of the project area, overlapping the record search zone in Sections 23, 24, and 27, T1N, R7E and Section 19, T1N, R8E. Seven sites were found in the record search area, but none overlap into the construction area, and none are eligible for inclusion in the National Register of Historic Places:
  - 39PN193 (Section 24, T1N, R7E) was an isolated find consisting of a single chert flake
  - 39PN194 (Section 24, T1N, R7E) was an isolated find
  - 39PN195 (Section 19, T1N, R8E) was an isolated find consisting of a single chert decortication flake
  - 39PN196 (Section 19, T1N, R8E) was an isolated find consisting of a gray quartzite flake
  - 39PN197 (Section 19, T1N, R8E) was an isolated find consisting of a gray quartzite flake
  - 39PN198 (Section 24, T1N, R7E) was a historic dump and a structure of unknown function. It consisted of 4 wooden poles and some boards
  - 39PN199 (Section 19, T1N, R8E) was a historic dump and a possible dugout or depression.
- Byrne (1994a) carried out an inventory a road project from 5th Street in Rapid City to the U.S. Highway 16 Bypass, overlapping the record search zone in Section 24, T1N, R7E. No sites or other cultural resources were found within the area covered by this record search.
- Byrne (1994b) conducted a second survey of a proposed truck bypass along 5th Street in Rapid City to the Highway 16 Bypass. The project overlapped the record search zone in Section 24, T1N, R7E and in Section 19, T1N, R8E. No sites were found.
- Kurtz (1987) conducted a survey in Sections 19 and 20, T1N, R8E. No sites were located.
- Flemmer (1988) examined a proposed truck route in Section 20, T1N, R8E. He did not find any sites.

- Buechler (1988) examined buried cable routes in Sections 19, 29, and 30, T1N, R8E. No cultural resources were found in the study area.
- Williams (1995) carried out a survey of portions of the proposed Heartland Expressway, overlapping the study area in Sections 29 and 32, T1N, R8E. He did not find any cultural resources in the study area.
- Buechler (1992) conducted a second survey of buried cable routes, which touched the study area in Section 27, T1N, R8E. He recorded one archaeological site in the study area:
  - 39PN1098 (Section 27, T1N, R8E) consisted of a historic concrete basement foundation filled with recent trash and a privy foundation. The site is not eligible for inclusion on the National Register.
- Buechler (1993b) examined several project areas for the Soil Conservation Service, overlapping the study area in Section 25, T1N, R8E. No sites were found.
- Buechler (1984) surveyed a wastewater treatment plant for Rapid City in Section 25, T1N, R8E. No cultural resources were located.
- Buechler (1991) also conducted a survey of an expansion for the wastewater treatment facility in Section 30, T1N, R9E. No sites were found on this survey.
- Buechler (2000) examined construction areas for West River Electric Association in Section 24, T1N, R9E and in Section 19, T1N, R10E; nothing was found.
- Miller and Ranney (1997) surveyed buried telephone routes for Golden West Telecom, overlapping the study area in Sections 6 and 7, T1N, R11E and Section 31, T2N, R11E. They did not find any sites.
- Buechler (1982) carried out an inventory of two microwave tower sites in Section 5, T1N, R11E. He did not record any sites on this project.
- Chevance (1996) examined a locality in Section 4, T1N, R11E for Western Area Power Administration. He did not locate any sites.

An examination of the National Register of Historic Places listing turned up no sites within the project area. Several previously recorded historic properties located in the project right-of-way, however, are considered eligible for inclusion on the Register. These are the Chicago, Milwaukee, and St. Paul Railroad and the Rapid Valley irrigation ditches. They will be discussed in more detail below.

Methods and Results

It had been initially hoped that the fieldwork could be carried out in March 2001. Poor weather held the project up, though, and it was not until early April that surveyors from Basin Electric were able to lay out the right-of-way on the ground. I conducted the field inventory of the project between April 17 and 27, interrupted by rain and a blizzard from April 21–25. The overall project location is depicted in Figure 1, and Figures 2–9 exhibit it in detail.

The project begins at the Basin Electric substation at New Underwood, in the NW1/4SW1/4 Section 5, T1N, R11E. The centerline runs south-southwest then southwest to a point about 120 ft. south of the section line in the NE1/4 of Section 7, T1N, R11E. It then runs due west through Section 7 and Sections 12–9, T1N, R10E until just inside the NE1/4 of Section 8, T1N, R10E. From there it angles west-southwest through Sections 8, 7 and 18, T1N, R10E and Sections 13, 14, and 23, T1N, R9E. It turns southwest in the middle of the N1/2 of Section 23 and angles through Sections 22 and 27, T1N, R9E. It runs just south of west from the extreme southwest corner of Section 27 through the NE1/4 of Section 28 to a point about 50 ft. (15 m) south of the

section line in the NE1/4 of Section 33, T1N, R9E. It runs from there due west to the half-section line in Section 33. This segment has a 100-foot (30-meter) right-of-way.

From the half-section line it runs west through Sections 33–31, T1N, R9E and Sections 36–33, T1N, R8E to the half-section line in Section 33. At this point it enters the site of the converter station, which occupies the S1/2SE1/4SW1/4, Section 28, T1N, R8E. This segment has a 133-foot (40-meter) right-of-way; 50 ft. (15 m) to the north of the centerline and 83 ft. (25 m) to the south.

The line proceeds west of the converter site about 50 ft. (15 m) north of the section line through Section 28 and to the half-section line of Section 29, T1N, R8E. It runs north up the half-section line to 50 ft. (15 m) south of the section line, then west along the north edge of Section 29. It angles slightly west-northwest across S.D. Highway 79, then runs west across the southern edge of Section 19, T1N, R8E. This segment has a 100-foot (30-meter) right-of-way.

The line angles slightly at the section line and runs west through Section 24, T1N, R7E to the Basin Electric Rapid City substation. The centerline is about 5 ft. (1.5 m) north of the section line and the right-of-way is 50 ft. (15 m) wide—5 ft. (1.5 m) to the south and 45 ft. (14 m) to the north of the line.

The inventory was conducted by pedestrian transects. In some areas a 100-foot (30-meter) wide meandering transect was employed to cover the area. In others two transects were necessary, and in the narrowest areas only a single 50-foot (15-meter) wide transect was required. The converter station was examined in transects spaced about 60 ft. (18 m) apart. Over most of the area surface visibility ranged from fair to excellent—anywhere from 20 to 90 percent. Even in areas where vegetation coverage was fairly dense, sufficient ground surface was visible in eroded patches, two-track and cow trails, and rodent burrows. Four shovel tests measuring about 30 cm (1 ft.) were dug where the line crossed the east bank of Rapid Creek.

Linear and areal survey totals are calculated in the table below:

Segment	Linear feet	(meters)	Miles	Acres	(hectares)
Eastern 100-foot right-of-way	63,945	(19,495)	12.11	146.80	(59.43)
133-foot right-of-way	31,680	(9,659)	6.00	96.73	(39.17)
Converter station site	—	—	—	20.00	(8.10)
Western 100-foot right-of-way	14,420	(4,396)	2.73	33.10	(13.40)
50-foot right-of-way	3,975	(1,212)	0.75	4.56	(1.85)
Total	114,020	(34,762)	21.59	301.19	(121.95)

Site Descriptions

Four sites were recorded during the inventory, and 2 previously known sites were intersected by the project right-of-way.

Archaeological Site 39PN1974

This site consists of a single rock cairn located on a high bluff overlooking Rapid Creek. To the south, the terrain slopes gradually down to Dry Creek (Figure 10). A total of 36 stones are visible on the surface—all heavily sodded in. They form a roughly circular mosaic measuring 250 cm (98 in.) east-west by 260 cm (102 in.) north-south. The stones range from about 10–30 cm (4–12 in.) across; most are of metaquartzite or granite. A close examination of the pasture and field surrounding the site area yielded no sign of other features or artifacts. The cairn was

mapped, but no excavation was attempted. Its position on the high bluff and the depth to which the stones have been buried in the sod are suggestive of an aboriginal affiliation.

Archaeological Site 39PN1975

Site 39PN1975 is situated on the high bluffs overlooking Boxelder Creek to the north (Figures 11, 12). Two small tertiary flakes—one of red (perhaps Spearfish) chert and the other of Tongue River silicified sediment—were found near the edge of the bluff. Visibility was very good over most of the area around the flakes, but no other artifacts could be found. Four shovel tests, each measuring 30 cm (12 in.), were excavated to a depth of about 35 cm (14 in.). Each confirmed a deflated surface of gravels underlain by a clayey soil mixed with gravel. No sign of cultural materials was found in the tests.

A rock cairn is located on the bluff edge about 40 m (130 ft.) southwest of the flakes. It consists of 10 large cobbles arranged in a pile measuring 80 cm (31 in.) north-south by 60 cm (24 in.) east-west. The stones range from about 10–30 cm (4–12 in.) across and are made of granite and metaquartzite cobbles. All are well sodden in. The cairn was mapped but not excavated. It is not possible to tell if the flakes are contemporaneous with the cairn; its position on the bluff suggests that it is of aboriginal origin.

Archaeological Site 39PN1976

This site is made up of a stone-lined well and a leveled building platform (Figures 13, 14). The platform is situated on a low, west-facing hill just above an old stock dam and an intermittent stream which runs north out of the nearby foothills of the Boxelder Creek escarpment. An area measuring about 40 by 40 ft. (12 by 12 m) was leveled in the hillside to accommodate a structure of some sort. No trace of foundations was found, and the only hints of a superstructure consisted of scattered fragments of two-by-four lumber with 16-penny nails in them. A search of the area revealed no sign of any bottles, cans, or other artifacts that would suggest a habitation of any sort.

There is a stone-lined well located about 100 ft. (30 m) west of the platform feature. The stones are local field stones and were laid without mortar. The well measured 6 ft. (1.8 m) across. It has been filled in, and at some time in the past someone laid old fence posts over the top. Adjacent to the well is what appears to the rear fender from a 1914–1915 vintage Model-T Ford (identified from a parts list at http://www.macsautoparts.com). A smashed, rusted, cannibalized car body, resembling a Model-T, is located about 300 ft. (90 m) south of the well and platform.

William D. Cosner homesteaded the property in 1916. Cosner lost it to the bank in 1943, and I.T. Pharis purchased it that same year. Glen Crosbie bought it in 1946, and in 1980 it passed to Gene F. Crosbie, the current owner.

The site does not appear to have been an occupation of any sort. There is no sign of habitation debris or other structures. The age of the car and lumber suggest a date sometime after about 1916, which is consistent with the Cosner ownership period. It likely consisted of some sort of shed for cattle and a well for watering them.

Historic Site PN-000-00452

This site consists of a small concrete bridge on an abandoned road grade (Figure 15). The project construction zone intersects it. The bridge is of the concrete slab variety, spanning a small intermittent stream. There is no maker's identification on the bridge, and the railings have been smashed off at some time in the past. The USGS 7.5-minute Rapid City East quadrangle

map (1953, photorevised 1978) shows an old road grade at this location, but no other information is available. It may have been an early incarnation of S.D. Highway 79, which currently parallels it about 300 m to the west. No trace of any road surface exists on the grade today to indicate whether it had ever been paved.

Archaeological Site 39PN2007

The project construction zone overlaps the bed of the Chicago, Milwaukee, and St. Paul Railroad southeast of Rapid City (Figure 16). The railroad has been assigned the number 39PN2007 in Pennington County and is considered eligible for inclusion on the National Register. At present the site consists of a single grade. Tracks and ties are present, although they have been covered over completely by a trail crossing them at the locality. No other features associated with the railroad are present. The USGS 7.5-minute Box Elder quadrangle map (1953, photorevised 1971) shows a siding called HO Siding at the locality, with the adjacent route of S.D. Highway 44 bending around it. No trace of it exists today, and Highway 44 runs directly parallel to the railroad. Presumably, sometime after 1971 the siding was removed by the reconstruction of the highway.

This segment of the railroad was built in 1907 and abandoned in 1980 (Mills 1998:154). It lacks any features or associated structures and could be considered a noncontributing segment of the overall site.

Rapid Valley Irrigation Ditches

The project crosses three of the historic irrigation ditches in Rapid Creek valley: the Cyclone, South Side, and Lone Tree ditches (Figure 17). The Cyclone ditch was built about 1890 by the Cyclone Ditch Co. (Johnson 1994b:1) The ditch is considered eligible for inclusion on the National Register. It consists of only the earthwork where the project intersects it; there are no structures or associated features present.

The South Side Ditch, also known as the Lower Rapid Ditch, was constructed in 1878. In 1904 the western portion of the ditch was abandoned and a new one was constructed parallel and south of it (Johnson 1994c:1). No structures or features are present where the project right-of-way intersects the ditch.

The Lone Tree Ditch runs north of Rapid Creek. It was constructed in 1880 and 1881 (Johnson 1994d:1). Two ditches are present, running parallel to each other. The project cuts across both ditches. No features or structures are present within the project right-of-way.

Recommendations

Site 39PN1974

This site is a single rock cairn located on the bluffs over Rapid Creek. Aboriginal stone cairns do not usually meet National Register criteria themselves. They may, however, have had a spiritual function, or have served as graves in some cases, to Native Americans. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected so long as construction activities avoid the cairn.

Site 39PN1975

Site 39PN1975 consists of both a minimal aboriginal artifact scatter and a single stone cairn on the heights overlooking Boxelder Creek. An examination of the area, including shovel tests,

did not turn up additional artifacts beyond the two flakes noted. There does not appear to be any likelihood of a buried component at the site. The artifact scatter does not appear to contribute to the site's potential significance. The cairn, like that of Site 39PN1974, may have had a spiritual significance to Native Americans. It is recommended that the site receive a Section 106 finding of No Historic Properties Affected if construction activities avoid the cairn.

Site 39PN1976

This site, consists of a stone-lined well and a leveled platform for some sort of farm or ranch outbuilding. It does not appear to meet Criteria A–C for inclusion on the National Register of Historic Places. Given its lack of building foundations and minimal utilization, it has little potential to meet Criterion D for the National Register, either. A Section 106 finding of No Historic Properties Affected is recommended for the site.

Site PN-000-00452

This site is a historic bridge on an abandoned road grade. The structure is small and of the concrete slab variety. It is a common type in South Dakota, and this particular one lacks integrity, since the concrete railings were destroyed. It does not appear to meet the criteria for the National Register. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

Site 39PN2007

The Chicago, Milwaukee, and St. Paul Railroad has received the '2007' site designation statewide; it is a linear archaeological site running for several hundred miles. The site has been determined eligible for inclusion on the National Register by the State Historic Preservation Officer. The 100–foot wide segment crossed by the project right-of-way lacks any structural features or associated sites, consisting only of the grade, tracks, and ties. It is a redundant section and does not appear to be a contributing segment of the site with respect to National Register eligibility (cf Hufstetler and Bedeau 1998). It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

Rapid Valley Irrigation Ditches

The Rapid Valley irrigation ditches are considered eligible for inclusion on the National Register:

> The Lower Rapid Valley Ditches are significant for their association with the development of irrigated agriculture in South Dakota. The ditches are representative examples of irrigation systems constructed, maintained, and operated by farmers (Johnson 1994a:1).

The project crosses the Cyclone, South Side, and Lone Tree ditches at points which consist only of the often-dredged earth ditches—no structures or associated sites are present. The ditch segments themselves seem to be noncontributing parts of the site. It is recommended that this site receive a Section 106 finding of No Historic Properties Affected.

State Planning Considerations

Both of the aboriginal archaeological sites are located in the South Fork Cheyenne Region defined in the State Plan for Archaeological Resources (Winham and Hannus 1990). The major

research goals set for this region relate to the need for basic data gathering to assist in building better interpretive framework. Cairns are one of the statewide prehistoric thematic subcontexts within the plan. Sites 39PN1974 and 39PN1975 provide baseline data with respect to the presence of aboriginal cairns in the region.

References Cited

Alex, Lynn Marie

1977 *A Cultural Resources Survey of a Proposed Truck Route between U.S. Highway 16 and S.D. Highway 79, EDA Project No. 05-51-26737, Pennington County, South Dakota*. Contract Report prepared for Pennington County, South Dakota by the S.D. State Archaeological Research Center, Fort Meade, SD.

1978 39BU2: A Fortified Site in Western South Dakota. *Newsletter of the South Dakota Archaeological Society* 9(3):3-7.

1991 *The Archeology of Beaver Creek Shelter (39CU779): A Preliminary Statement*. Selections from the Division of Cultural Resources No. 3. U.S. National Park Service, Rocky Mountain Region.

Buechler, Jeffrey V.

1982 *Cultural Resources Survey of Two Proposed Microwave Tower Sites, Pennington County, South Dakota*. Contract Investigations Series 66, S.D. Archaeological Research Center, Fort Meade, S.D.

1984 *Cultural Resources Survey of the Proposed Rapid City Wastewater Treatment Plant Improvement Project, Pennington County, South Dakota*. Contract report prepared for Utility Engineering Corporation, Rapid City, S.D. by Dakota Research Services, Rapid City, S.D.

1991 *A Cultural Resource Inventory Survey of Wastewater Sludge Disposal Expansion for the City of Rapid City in Pennington County, South Dakota*. Project No. 91-2, Dakota Research Services, Rapid City, S.D.

1992 *A Cultural Resources Inventory Survey of Buried Cable Routes in Meade and Pennington Counties, South Dakota*. Project No. 92-14, Dakota Research Services, Rapid City, S.D.

1993a *A Cultural Resources Inventory Survey of the Southwest Connector Route in Pennington County, South Dakota*. Project No. 93-3, Dakota Research Services, Rapid City, S.D.

1993b *A Cultural Resources Inventory Survey of a Sample of FY1992 Soil Conservation Service Construction Projects in the Rapid Creek Drainage Basin, Pennington County, South Dakota*. Project No. 93-12, Dakota Research Services, Rapid City, S.D.

1988 *A Short Format Report of an Intensive Cultural Resource Inventory of Selected Segments of Buried Cable Routes in Pennington, Custer, and Fall River Counties, South Dakota*. Project No. 88-15, Dakota Research Services, Rapid City, S.D.

2000 *A Short Format Report of an Intensive Cultural Resources Inventory Survey of West River Electric Association, Inc.'s Construction Activities in Pennington County, South Dakota*. Project No. 00-48, Dakota Research Services, Rapid City, S.D.

Byrne, Daniel R.
1994a *Intensive Cultural Resources Survey of a Small Road Project along 5th Street from Texas Street to U.S. Highway 16 Truck By-Pass, Rapid City, Pennington County, South Dakota.* Contract Investigation Series No. 869, State Archaeological Research Center, Rapid City, S.D.

1994b *Intensive Cultural Resources Survey of the South Dakota Department of Transportation Small Road Project P 1669(30), PCEMS 4094, The 5th Street Truck By-Pass Alternative Alignment No. 1, Rapid City, Pennington County, South Dakota.* Contract Investigation Series No. 1036, State Archaeological Research Center, Rapid City, S.D.

Cassells, E. Steven, D.B. Miller, and P.V. Miller
1984 *Paha Sapa: A Cultural Resources Overview of the Black Hills National Forest, South Dakota and Wyoming.* Prepared for the Black Hills National Forest, U.S. Forest Service, by Plano Archaeological Consultants, Longmont, Colorado.

Chevance, Nicholas
1996 Cultural Resources Inventories of Four Proposed Projects in Day, Pennington, and Stanley Counties, South Dakota. Western Area Power Administration, Billings, Montana.

Darton, N.H., and S. Paige
1925 *Central Black Hills Folio, South Dakota.* Geological Folio No. 219:1-34, U.S. Geological Survey.

Donohue, James A.
1998 *The Chronology of the Jim Pitts Site and Implications for the Temporal Placement of the Goshen-Plainview Complex in the Northwestern Plains.* Paper presented at the 63rd Annual Society for American Archaeology meeting, Seattle, Washington.

Flemmer, Dan
1988 *Southeastern Rapid City Proposed Truck Route Cultural Resources Survey, Pennington County, South Dakota.* Contract Investigation Series No. 318, State Archaeological Research Center, Rapid City, S.D.

Frison, George
1991 *Prehistoric Hunters of the High Plains*, 2nd Ed. Academic Press, New York.

Froiland, Sven G.
1978 *Natural History of the Black Hills.* Center for Western Studies, Augustana College, Sioux Falls, South Dakota.

Hannus, L. Adrian
1980 *The Lange/Ferguson Site.* Paper presented at the 39th Plains Anthropology Conference.

1982 *Evidence of Mammoth Butchering at the Lange/Ferguson (39SH33) Clovis Kill Site.* Paper presented at the 47th Annual Meeting, Society for American Archaeology.

Hughes, Jack T.
1949 Investigations in Western South Dakota and Northwestern Wyoming. *American Antiquity* 14:266-277.

Hufstetler, Mark and Michael Bedeau
1998 *South Dakota's Railroads: An Historic Context.* Prepared for the S.D. State Historic Preservation Office by Renewable Technologies, Inc., Butte Montana.

Hurt, Wesley R.
1960 A New Radiocarbon Date from South Dakota. *Museum News* 21(11-12):1-3, W.H. Over Museum, University of South Dakota.

Irwin Williams, Cynthia, Henry Irwin, George Agogino, and C.V. Haynes
1973 Hell Gap: Paleo-Indian Occupation on the High Plains. *Plains Anthropologist* 18-59:40-53.

Johnson, Lon
1994a *Historic American Engineering Record: Historical and Descriptive Data, Lower Rapid Valley Irrigation Ditches, HAER No. 5.* Prepared for the Historical American Engineering Record, National Park Service, Dept. of the Interior by Renewable Technologies, Inc., Butte Montana.

1994b *Historic American Engineering Record: Cyclone, Lower Rapid Valley Irrigation Ditches, HAER No. 7.* Prepared for the Historical American Engineering Record, National Park Service, Dept. of the Interior by Renewable Technologies, Inc., Butte Montana.

1994c *Historic American Engineering Record: Lower Rapid Ditch (South Side Ditch), Lower Rapid Valley Irrigation Ditches, HAER No. 8.* Prepared for the Historical American Engineering Record, National Park Service, Dept. of the Interior by Renewable Technologies, Inc., Butte Montana.

1994d *Historic American Engineering Record: Lone Tree Ditch, Lower Rapid Valley Irrigation Ditches, HAER No. 11.* Prepared for the Historical American Engineering Record, National Park Service, Dept. of the Interior by Renewable Technologies, Inc., Butte Montana.

Kalvels, John
1982 *Soil Survey of Fall River County, South Dakota.* Soil Conservation Service, U.S. Dept. of Agriculture, and the Agricultural Experiment Station, S.D. State University.

Karolevitz, Robert F.
1975 *Challenge: The South Dakota Story.* Brevet Press, Sioux Falls, S.D.

Kurz, William M.
1987 *A Cultural Resources Survey for a Truck Weight Station in Sections 17, 19, and 20, T1N, R8E, Pennington County, South Dakota.* Contract Investigations Series 243. S.D. State Archaeological Research Center, Rapid City, SD.

Lippincott, Kerry
1995 *A Late Prehistoric Period Pronghorn Hunting Camp in the Southern Black Hills, South Dakota: Site 39FA23.* MS on file, State Archaeological Research Center, Rapid City, S.D.

McKern, W.C.
1939 The Midwestern Taxonomic Method as an Aid to Archaeological Culture Study. *American Antiquity* 4:301-313.

Miller, David B.
1985 *Gateway to the Hills, an Illustrated History of Rapid City.* Windsor Publications, Inc., Northridge, California.

Miller, Paul V. and William Ranney
1997 *A Level III Cultural Resource Inventory of Proposed Buried Cable Routes for Golden West Telecom, Inc. in Meade and Pennington Counties, South Dakota.* Contract No. 97-3, Frontier Cultural , Custer, S.D.

Mills, Rick W.
1990 *Railroading in the Land of Infinite Variety: A History of South Dakota's Railroads.* Battle Creek Publishing Co., Hermosa, S.D.
1998 *The Milwaukee Road in Dakota.* Battle Creek Publishing Co., Hermosa, S.D.

Mulloy, William T.
1958 A Preliminary Historical Outline for the Northwestern Plains. *University of Wyoming Publications in Science* 18(1):1-70.

Neuman, Robert J.
1975 *The Sonota Complex and Associated Sites on the Northwestern Plains.* Publications in Anthropology No. 6, Nebraska State Historical Society.

Reeves, Bryan O.K.
1970 *Culture Change in the Northern Plains: 1000 B.C.-A.D. 1000.* Ph.D. dissertation, Department of Archaeology, Calgary University.

Reher, Charles A.
1977 Ethnology and History. In *Archaeology of the Eastern Powder River Basin.* G. Zeimens and D. Walker, eds. Prepared for the U.S. Bureau of Land Management by the Office of the Wyoming State Archaeologist, Laramie.

Schell, Herbert S.
1961 *History of South Dakota.* University of Nebraska Press.

South Dakota WPA Writers' Project
n.d. *Annals of Early Rapid City 1878–87,* Vol.11, Farming and Ranching. Transcribed and edited by the South Dakota WPA Writers' Project. University of South Dakota State-wide Sponsor of the South Dakota Writers' Project, Sponsored by the Rapid City Public Library. From the Black Hills Journal and the Rapid City Daily Journal.

Tratebas, Alice M., and Kristi Vagstad
1979 *Archaeological Test Excavations of Four Sites in the Black Hills National Forest, South Dakota.* Contract Investigations Series 6, State Archaeological Research Center, Rapid City, S.D.

Wheeler, Richard P.
n.d. *Archeological Remains in Three Reservoir Areas in South Dakota and Wyoming. Part I: Archeological Remains in the Angostura Reservoir Area, South Dakota.* Ms. on file, State Archaeological Research Center, Rapid City, S.D.

Williams, Roger R.
1995 *An Intensive Cultural Resources Inventory along a Segment of the Proposed Heartland Expressway, S.D. Highway 79, Pennington and Custer Counties, South Dakota.* Contract Investigations Series 1123, S.D. State Archaeological Research Center, Rapid City, S.D.

Willey, Gordon
1966 *An Introduction to American Archaeology*, Volume 1. Prentice-Hall, Englewood Cliffs, New Jersey.

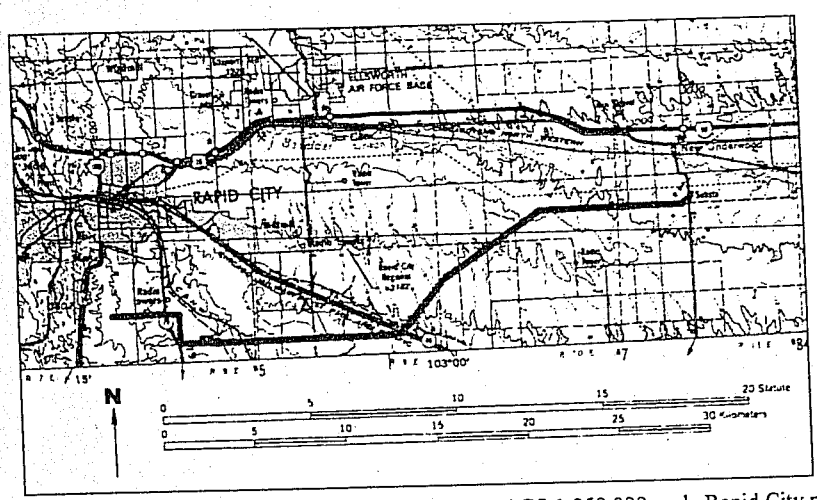


Figure 1. Map showing general project location (from USGS 1:250,000 scale Rapid City map.)

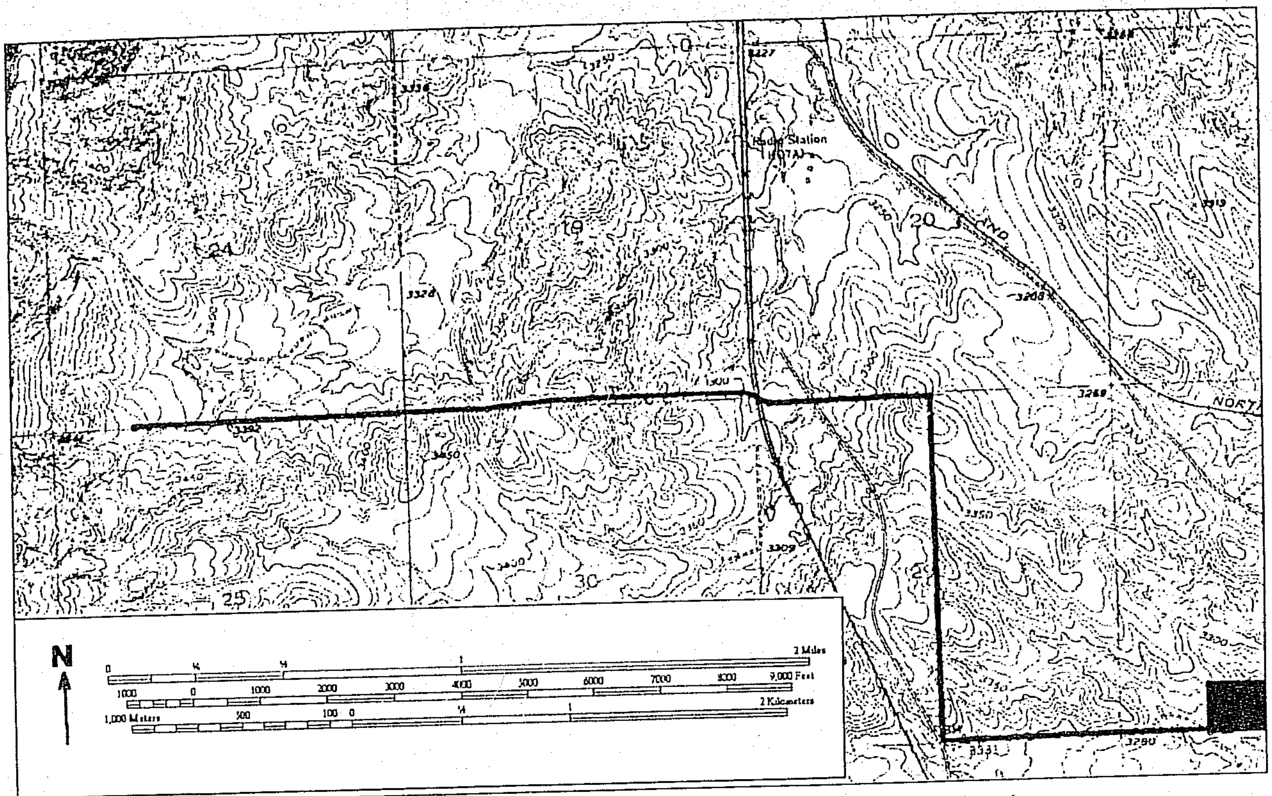


Figure 2. Map of project area in Townships 1N, 7E and 1N, 8E. From USGS Rapid City East 7.5' quadrangle.

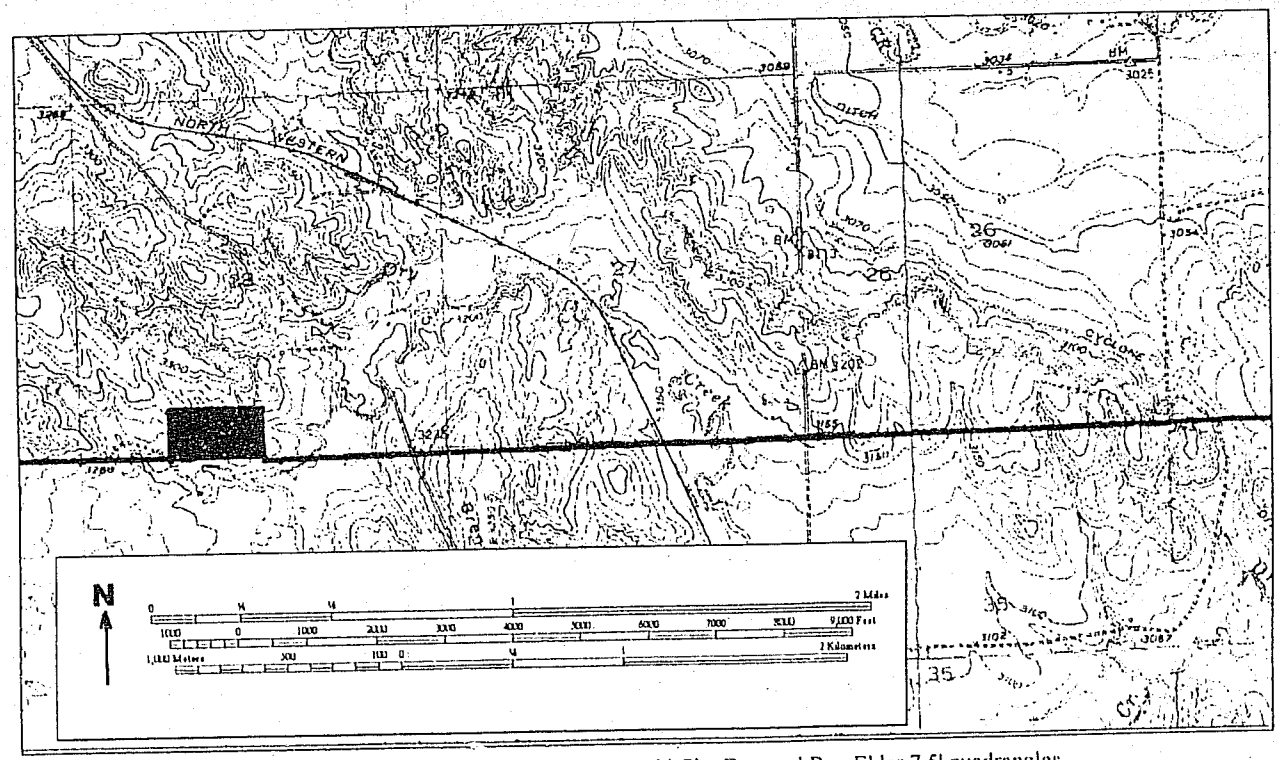


Figure 3. Map of project area in Township 1N, 8E. From USGS Rapid City East and Box Elder 7.5' quadrangles.

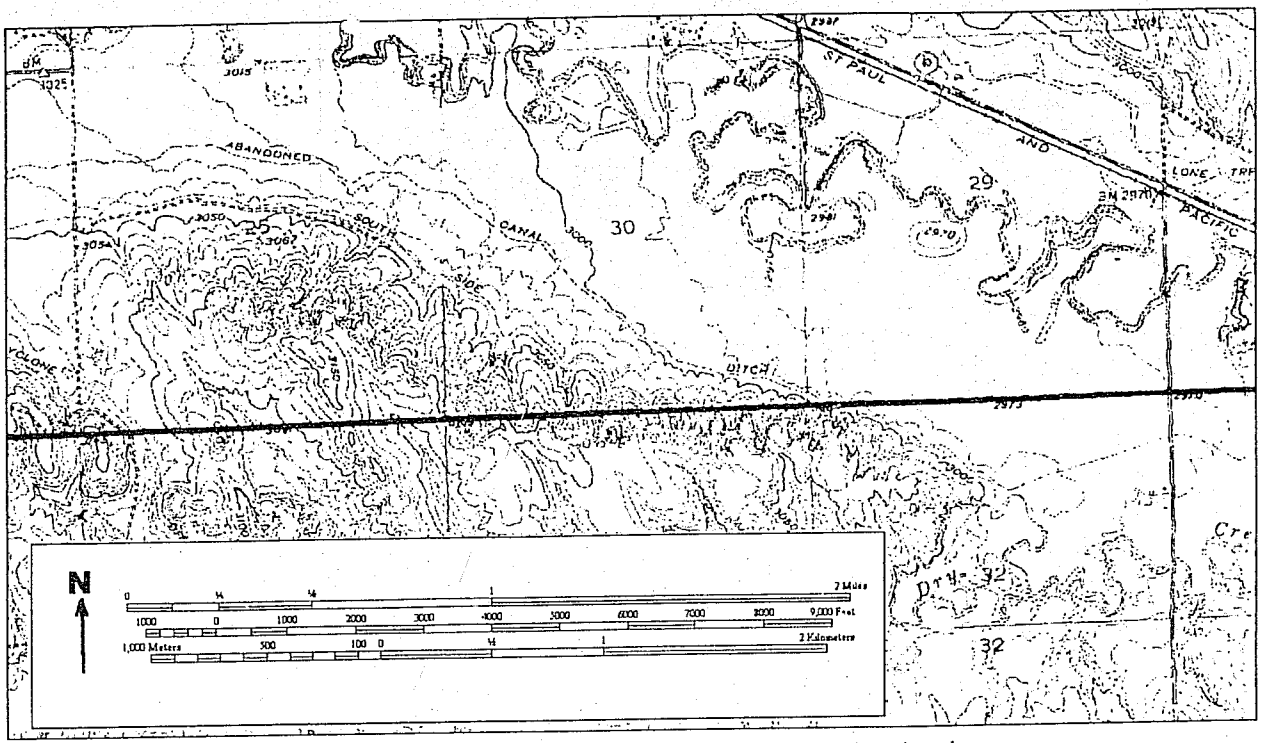


Figure 4. Map of project area in Townships 1N, 8E and 1N, 9E. From USGS Box Elder 7.5' quadrangle.

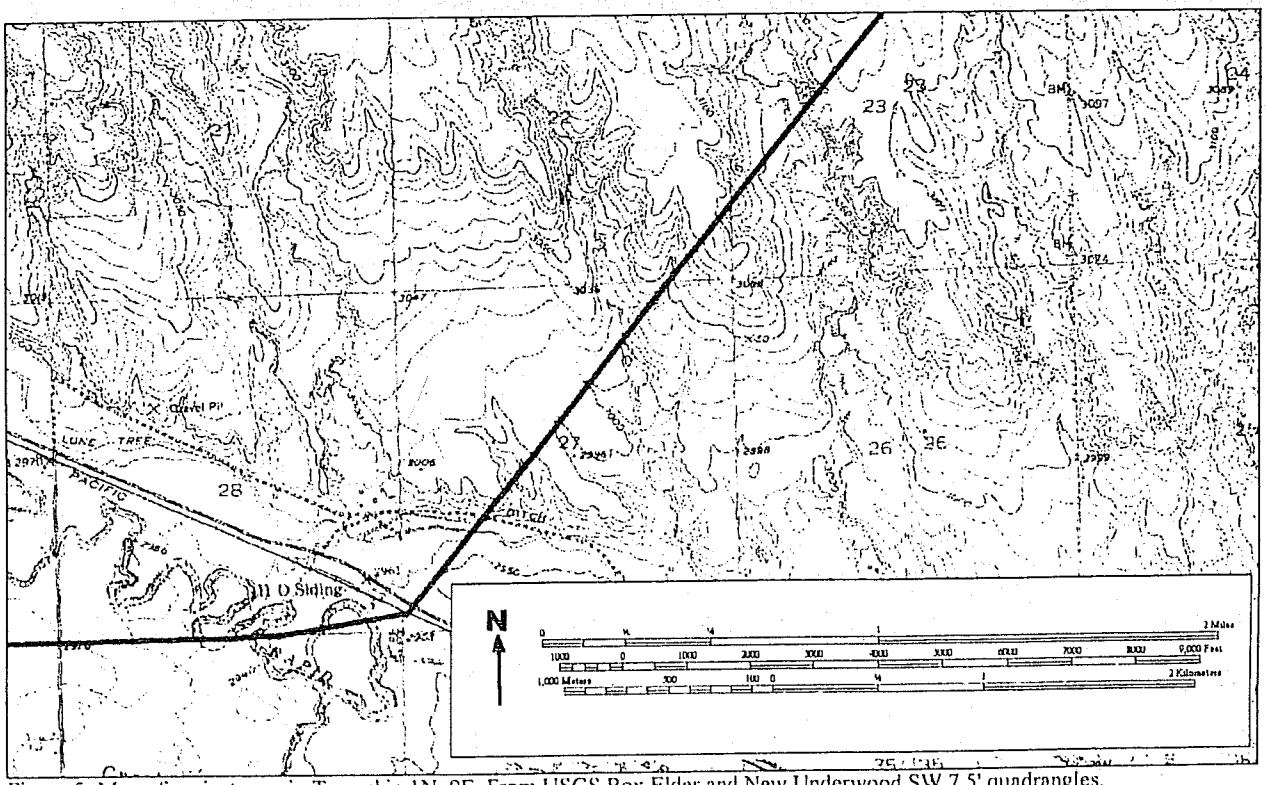


Figure 5. Map of project area in Township 1N, 9E. From USGS Box Elder and New Underwood SW 7.5' quadrangles.

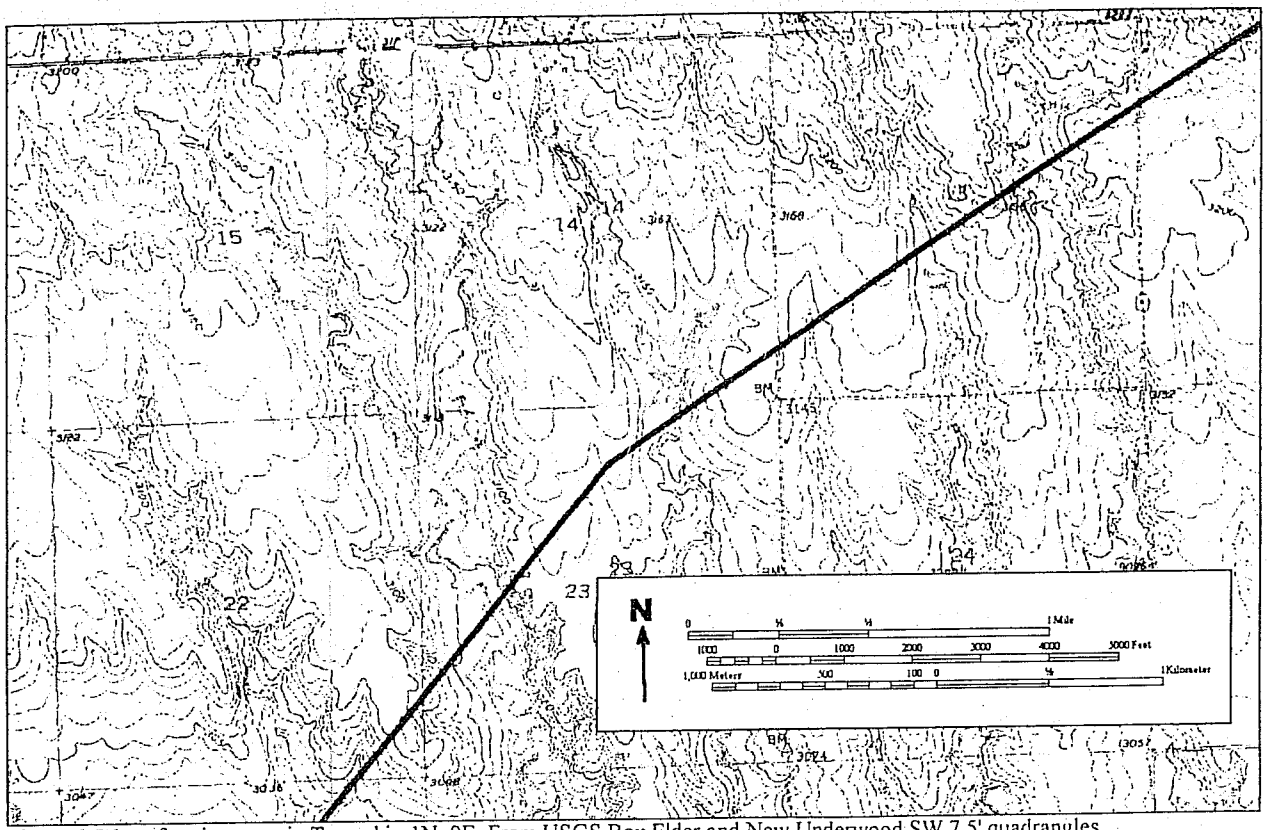


Figure 6. Map of project area in Township 1N, 9E. From USGS Box Elder and New Underwood SW 7.5' quadrangles.

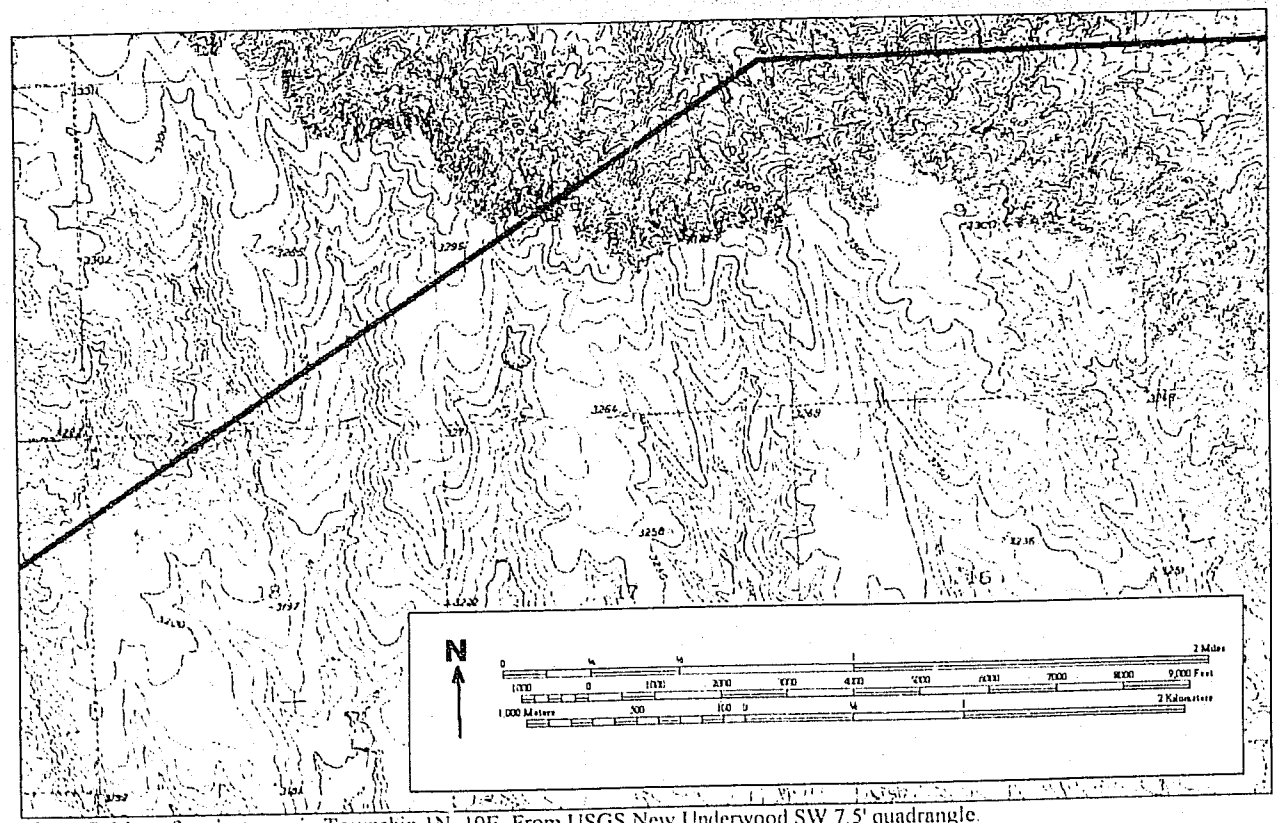


Figure 7. Map of project area in Township 1N, 10E. From USGS New Underwood SW 7.5' quadrangle.

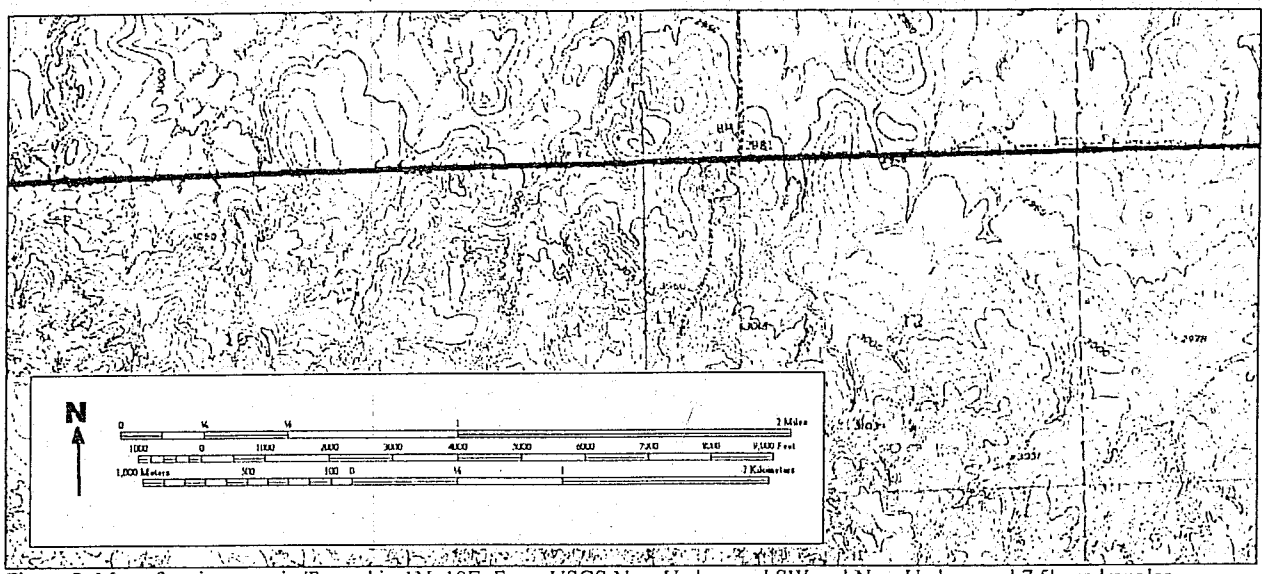


Figure 8. Map of project area in Township 1N, 10E. From USGS New Underwood SW and New Underwood 7.5' quadrangles.

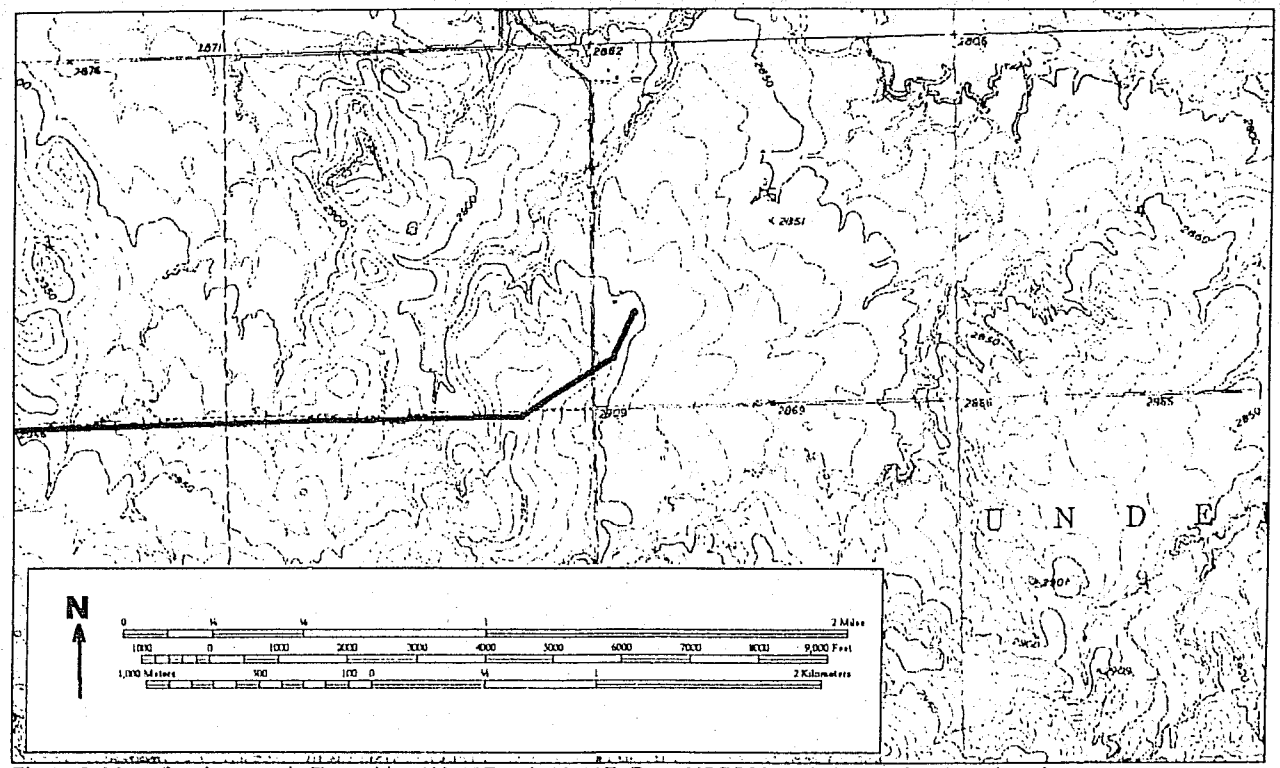


Figure 9. Map of project area in Townships 1N, 10E and 1N, 11E. From USGS New Underwood 7.5' quadrangle.

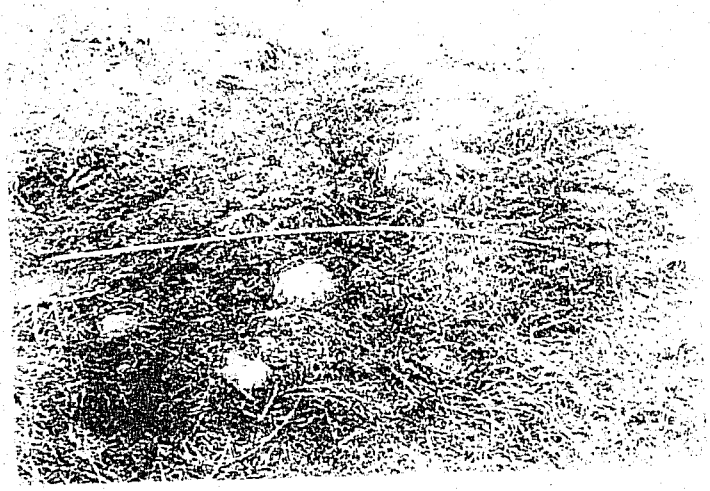


Figure 10. Cairn at 39PN1974, facing north.

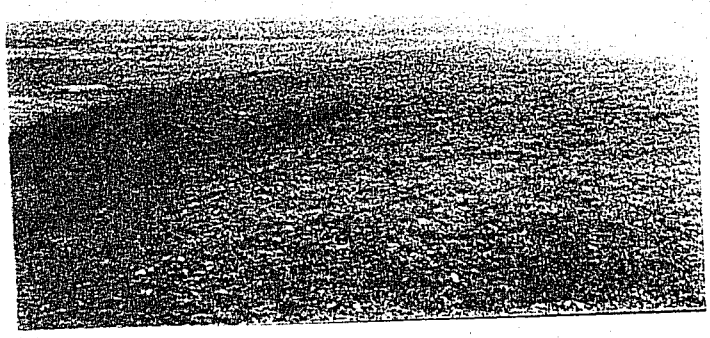


Figure 11. Site 39PN1975, facing north.

Figure 16. Grade and tracks at 39PN2007, facing northwest. Note lack of historic siding.

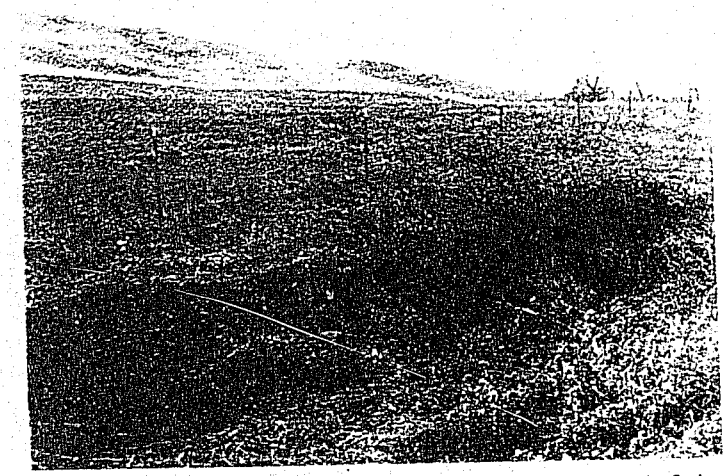


Figure 17. South Side Ditch where project right-of-way intersects it, facing west.

Appendix

Site Forms

Bob Sahr, Chair
Dustin Johnson, Vice-Chair
Gary Hanson, Commissioner

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

500 East Capitol Avenue
Pierre, South Dakota 57501-5070
www.puc.sd.gov

Capitol Office
(605) 773-3201
(605) 773-3809 fax

Transportation/Warehouse
(605) 773-5280
(605) 773-3225 fax

Consumer Hotline
1-800-332-1782

March 23, 2006

Evan Mandigo
Director of Risk and Insurance
Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58503

RE: Docket No. EL01-025

Dear Mr. Mandigo:

I am in receipt of your letter dated February 21, 2006, regarding the above-referenced docket. Basin Electric Power Cooperative has requested a release from the bond that was filed in connection with the permit to construct transmission facilities. The bond was filed with the Commission in December 2002. The need for the bond was concluded prior to December 11, 2005, thus the bond is no longer needed.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Karen E. Cremer

Karen E. Cremer
Staff Attorney

Cc: Delaine Kolbo